

management for the American River Group will be considered by the American River Group (ARG).

DSM2 Model

Delta Simulation Model II (DSM2) simulations were performed and evaluated for three operational management scenarios (Table 1). These simulations were designed to evaluate potential effects of the Project Description's reduced Sacramento and San Joaquin River outflow and other operational modifications on potential Delta hydrodynamics for the months of April through May when listed salmonids are most likely to be present in the Delta and hydrology forecasts are more foreseeable. These scenarios were concatenated to look at a 31-day pulse flow period ("April") and post-pulse period ("May") to evaluate DSM2 results. The Baseline scenario (Hydrology 1) represents an unmodified set of D-1641 standards for NDOI, Vernalis flows, and Delta Cross Channel Gate operations, while a Project Description scenario (Hydrology 2) included a modified NDOI and Vernalis flows.

The April modeled Vernalis average monthly flow, which were inclusive of an Appendix 2e pulse flow volume is likely positively biased compared to the predicted Vernalis average monthly flow during the pulse flow period, which in the TUCP is proposed to be no less than 710cfs. According to the modeled flows at Channel 6 (Mossdale, downstream of Vernalis but likely to have similar flow) summarized in Table 4 and 5, the modeled monthly average flow during April and May was 951 cfs, 241 cfs more than the 710 cfs proposed in the current TUCP order. Whether realized flows at Vernalis will more closely match the modeled flows or the proposed flows will depend on accretions and depletions during April and May. This uncertainty suggests modeled flows under the Project Description are likely greater than what will actually be observed, which influences the interpretation of any possible impacts on fishes resulting from the Project Description. Additionally, results from a hydrodynamic scenario with similar NDOI and Vernalis flows and an open DCC gate for two months are presented (Hydrology 2'). Other input values remained constant and reflected the best information available to DWR modelers when models were run on March 13, 2015. These flows do not necessarily reflect current forecast information and actual conditions have and will differ from the modeled scenarios. The modeled scenarios represent minimum values, yet provide the best evaluation approach to describing the worst conditions likely to be observed for the flow measures. These issues increase the uncertainty of assessments of impacts to all species reviewed.

Table 1. DSM2 Model Input for Scenarios Evaluated in the Biological Review. DSM2 Run Name is Listed Parenthetically for Each Scenario

Scenario	NDOI		Freeport flow (cfs)		Vernalis flow (cfs)		Combined Exports (cfs)		DCC Status
	April	May	April	May	April	May	April	May	
Baseline (Hydrology 1)	7,100		7,100- (VNS +export)		710 +3100 cfs (4/1 -5/1)		1,500		Closed
Project Description -- DCC Gate Closed (Hydrology 2)	4,000		4,000-(Lower VNS +export)		300+App. 2e flow (4/1 -- 5/1) ¹		1,500		Closed
Project Description -- DCC Gate Open (Hydrology 2')	4,000		4,000-(Lower VNS +export)		300+App. 2e flow (4/1 -- 5/1) ¹		1,500		Open for 2 months

DSM2 modeling outputs for each scenario were used to evaluate the distribution of 15-minute flow and velocity values for multiple channels, including:

- Upstream of Head of Old River on San Joaquin (Channel 6)
- Downstream of Head of Old River on San Joaquin (Channel 9)
- Upstream of Stockton Deepwater Shipping Channel (Channel 12)
- Jersey Point on San Joaquin River (Channel 49)
- Sherman Island on San Joaquin River (Channel 50)
- Downstream of Head of Old River on Old River (Channel 54)
- Old River south of Railroad Cut (Channel 94)
- Old River at San Joaquin River (Channel 124)
- Middle River north of Railroad Cut (Channel 148)
- Three Mile Slough near San Joaquin River (Channel 310)
- Sacramento River near Sherwood Harbor (Channel 412)
- Sacramento River at Sutter Slough (Channel 388)
- Sacramento River upstream of Delta Cross Channel (Channel 421)
- Sacramento River downstream of Delta Cross Channel (Channel 422)

¹ The TUCP identifies proposed modification of the average monthly flow during the Vernalis 31-day pulse flow period to be no less than 710 cfs.

- Sacramento River upstream of Georgiana Slough (Channel 422)
- Sacramento river downstream of Georgiana Slough (Channel 423)
- Sacramento River near Cache Slough (Channel 429)
- Sherman Island on Sacramento River (Channel 434)

Hydrodynamic Metrics

Hydrodynamic metrics, such as daily mean velocity and flow were calculated (Tables 2-5). Additionally, mean daily proportion positive velocity, daily mean velocity, and daily mean flow were used to assess changes in the Delta at these locations. These were calculated over the separate April and May periods (Tables 6-7).

These data are also visualized spatially at both temporal steps to assess regional impacts and more complex hydrodynamics around the Delta Cross Channel and Head of Old River under each scenario. Daily proportion positive velocity is the percentage of the day that river flows have a positive velocity value (flows in downstream direction). Daily mean velocity and mean flow are the average of all values summed over the 24 hour period, which takes into account the effects of tidal stage on velocity magnitudes. These daily values are then averaged for the period of interest. The difference in the values of these hydrodynamic metrics between the Baseline and Project Description model run was calculated to assess how the metric was affected by the Project Description. We also calculated the difference in the values of these hydrodynamic metrics between the Project Description and Project Description with DCC gates open scenarios.

Density plots of DSM2 modeled 15-minute velocity data were developed for the eighteen channel nodes modeled for the two scenarios. Figures 2-23 show nodes showing variation between modeled scenarios in April and May periods for the different hydrology scenarios. These plots show low levels of change in the 15-minute velocity plots and in the lower river reaches tidal hydrodynamics and channel morphology drive channel velocities to a greater extent than the operational differences evaluated in the modeled scenarios. Figures 24-27 show spatially key channel nodes through the Delta during April and May for a few of the hydrodynamic metrics.

Differences in the river inflow between the Project Description and Baselines modeled scenarios are seen in the velocity plots at the upper extent of the tidal influence on the Sacramento near Sherwood Harbor (Figure 2-3) and San Joaquin river near Head of Old River (Figures 16-17). In the May portion of the model runs, there is a larger difference between the Baseline and Project Description modeled velocities due to reduced San Joaquin River contribution to the NDOI and thus greater flows at Freeport in May than April (Figures 2 and 3). At all other channel nodes during May and all nodes for the April portion of the model runs, the influence of these river inflows quickly dissipates as tides begin to dominate on the Sacramento (Figures 4-15). An open DCC gates during these months also impacts velocities upstream of the DCC gates (Channel node 421, Figures 6-7), and modeled results show a greater range of velocities, both negative and positive in this reach, due to increased flows rates downstream on an ebbing tide and upstream on a flooding tide. Modeled channel velocities in the Sacramento River near the DCC and Georgiana Slough differ between the Baseline and Project Description scenarios. Modeled results from the Project Description with an open DCC show a reduction in daily mean velocities in April and May downstream of the DCC (Channel node 422; Figures 8-9). At locations in the

North Delta further south, tidal conditions dominate and the range and magnitude of velocities observed in the modeling are similar into the western Delta (Figures 10-15).

Difference between the Project Description and Baseline model run influence the velocity along the San Joaquin River more during the modeled April period than May period (Figures 16-21) from upstream of Head of Old River to downstream of the Stockton Deepwater Ship Channel. These differences influence the proportion of daily positive flow (Tables 6-7), daily velocities (Tables 2-3), and daily flows (Tables 4-5). In the South Delta along Old and Middle River corridor, these changes are less significant due to the low export levels in the Baseline and Project Description model run. The modeled daily average hydrodynamic changes resulting from the proposed operations for both the April and May periods are small (Tables 4-5, approximately 62cfs for channel 148 in April and 152cfs in May) and do not show substantive differences in daily average velocities (Tables 2-3, Figure 22-23) between Baseline period at channel node 148 (Middle River north of Railroad Cut).

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Table 2. Daily Mean Velocities (ft/sec) between Base and Project Description Model Scenarios and Their Difference (Hydrology 2 minus Hydrology 1) at All Channel Nodes during April

Date	Node 6			Node 9			Node 12			Node 49			Node 50			Node 54			Node 94			Node 124			Node 148		
	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference
1-Apr	1.20	0.26	-0.94	1.29	0.20	-1.09	1.05	0.19	-0.86	0.09	0.07	-0.03	0.10	0.08	-0.02	0.36	-0.06	-0.20	-0.01	-0.03	-0.04	-0.06	-0.06	0.01	-0.02	-0.03	-0.01
2-Apr	1.21	0.34	0.87	1.38	0.30	1.08	1.14	0.26	0.88	0.08	0.06	0.02	0.10	0.07	0.02	0.37	-0.06	0.18	-0.04	-0.03	0.02	-0.07	-0.06	-0.01	-0.03	-0.03	0.01
3-Apr	1.21	0.38	0.82	1.38	0.35	1.03	1.14	0.31	0.84	0.07	0.05	0.02	0.09	0.07	0.02	0.37	-0.06	0.16	-0.03	-0.03	0.02	-0.07	-0.06	-0.01	-0.03	-0.03	0.01
4-Apr	1.20	0.38	0.82	1.38	0.36	1.02	1.14	0.31	0.83	0.07	0.04	0.02	0.08	0.06	0.02	0.37	-0.06	0.16	-0.02	-0.03	0.02	-0.07	-0.06	-0.01	-0.02	-0.03	0.01
5-Apr	1.20	0.38	0.82	1.38	0.36	1.02	1.15	0.32	0.83	0.06	0.04	0.02	0.08	0.06	0.02	0.37	-0.06	0.16	-0.02	-0.03	0.02	-0.07	-0.06	-0.01	-0.02	-0.03	0.01
6-Apr	1.20	0.38	0.82	1.38	0.36	1.02	1.15	0.32	0.83	0.05	0.02	0.02	0.06	0.04	0.02	0.37	-0.07	0.16	-0.02	-0.03	0.02	-0.07	-0.07	-0.01	-0.03	-0.03	0.01
7-Apr	1.20	0.38	0.82	1.38	0.36	1.02	1.15	0.32	0.83	0.04	0.01	0.02	0.05	0.03	0.02	0.37	-0.07	0.16	-0.02	-0.03	0.02	-0.07	-0.07	-0.01	-0.03	-0.03	0.01
8-Apr	1.20	0.38	0.82	1.38	0.36	1.02	1.15	0.32	0.83	0.02	0.00	0.02	0.03	0.01	0.02	0.37	-0.07	0.16	-0.03	-0.04	0.02	-0.08	-0.07	-0.01	-0.03	-0.04	0.01
9-Apr	1.21	0.39	0.82	1.39	0.38	1.01	1.16	0.33	0.83	0.02	-0.01	0.02	0.03	0.00	0.02	0.37	-0.06	0.17	-0.02	-0.04	0.02	-0.07	-0.06	-0.01	-0.03	-0.04	0.01
10-Apr	1.21	0.40	0.81	1.41	0.42	0.99	1.17	0.36	0.81	0.02	0.00	0.02	0.03	0.01	0.02	0.36	-0.05	0.17	0.01	-0.02	0.02	-0.06	-0.05	-0.01	-0.02	-0.02	0.01
11-Apr	1.21	0.40	0.81	1.42	0.42	0.99	1.19	0.38	0.81	0.05	0.03	0.02	0.06	0.04	0.02	0.36	-0.04	0.17	0.04	0.00	0.02	-0.05	-0.04	-0.01	0.00	0.00	0.01
12-Apr	1.22	0.40	0.82	1.41	0.41	1.00	1.19	0.38	0.82	0.09	0.06	0.02	0.09	0.07	0.02	0.36	-0.04	0.17	0.05	0.00	0.02	-0.05	-0.04	-0.01	0.01	0.00	0.01
13-Apr	1.21	0.39	0.82	1.41	0.40	1.01	1.18	0.36	0.82	0.10	0.08	0.02	0.11	0.09	0.02	0.36	-0.04	0.17	0.05	0.00	0.02	-0.05	-0.04	-0.01	0.01	0.00	0.01
14-Apr	1.21	0.39	0.82	1.40	0.39	1.01	1.17	0.35	0.82	0.11	0.09	0.02	0.12	0.10	0.02	0.36	-0.04	0.17	0.04	0.00	0.02	-0.05	-0.04	-0.01	0.01	0.00	0.01
15-Apr	1.20	0.38	0.83	1.38	0.36	1.02	1.17	0.34	0.82	0.11	0.09	0.02	0.13	0.10	0.02	0.36	-0.05	0.16	0.03	0.00	0.02	-0.06	-0.05	-0.01	0.00	0.00	0.01
16-Apr	1.20	0.38	0.82	1.37	0.35	1.02	1.15	0.33	0.83	0.11	0.09	0.02	0.13	0.11	0.02	0.36	-0.05	0.16	0.02	-0.01	0.02	-0.06	-0.05	-0.01	0.00	-0.01	0.01
17-Apr	1.19	0.37	0.81	1.36	0.34	1.02	1.14	0.31	0.83	0.11	0.09	0.02	0.13	0.11	0.02	0.36	-0.06	0.16	0.00	-0.02	0.02	-0.07	-0.06	-0.01	-0.01	-0.02	0.01
18-Apr	1.18	0.37	0.81	1.35	0.34	1.01	1.13	0.31	0.82	0.10	0.08	0.02	0.12	0.10	0.02	0.36	-0.06	0.16	-0.02	-0.03	0.02	-0.07	-0.06	-0.01	-0.02	-0.03	0.01
19-Apr	1.18	0.37	0.81	1.35	0.35	1.00	1.13	0.31	0.82	0.08	0.05	0.02	0.10	0.08	0.02	0.36	-0.07	0.16	-0.03	-0.03	0.02	-0.08	-0.07	-0.01	-0.03	-0.03	0.01
20-Apr	1.18	0.37	0.80	1.35	0.35	1.00	1.14	0.31	0.82	0.05	0.03	0.02	0.08	0.05	0.02	0.36	-0.07	0.16	-0.03	-0.04	0.02	-0.08	-0.07	-0.01	-0.03	-0.04	0.01
21-Apr	1.18	0.38	0.81	1.36	0.35	1.01	1.14	0.32	0.83	0.03	0.01	0.02	0.05	0.03	0.02	0.36	-0.07	0.16	-0.03	-0.04	0.02	-0.08	-0.07	-0.01	-0.03	-0.04	0.01
22-Apr	1.19	0.38	0.81	1.38	0.36	1.02	1.15	0.32	0.83	0.02	0.00	0.02	0.03	0.01	0.02	0.36	-0.07	0.16	-0.03	-0.04	0.02	-0.08	-0.07	-0.01	-0.03	-0.04	0.01
23-Apr	1.20	0.40	0.81	1.40	0.40	1.00	1.16	0.34	0.82	0.02	-0.01	0.02	0.03	0.00	0.02	0.36	-0.06	0.16	-0.01	-0.03	0.02	-0.07	-0.06	-0.01	-0.03	-0.03	0.01
24-Apr	1.22	0.40	0.81	1.42	0.42	1.00	1.19	0.38	0.81	0.03	0.01	0.02	0.04	0.02	0.02	0.36	-0.05	0.17	0.03	-0.01	0.02	-0.05	-0.05	-0.01	0.00	-0.01	0.01
25-Apr	1.22	0.41	0.82	1.43	0.43	1.01	1.20	0.38	0.82	0.07	0.05	0.02	0.07	0.05	0.02	0.36	-0.04	0.17	0.05	0.00	0.02	-0.05	-0.04	-0.01	0.01	0.00	0.01
26-Apr	1.23	0.40	0.83	1.43	0.42	1.01	1.20	0.38	0.83	0.09	0.07	0.02	0.09	0.07	0.02	0.37	-0.04	0.17	0.05	0.00	0.02	-0.05	-0.04	-0.01	0.01	0.00	0.01
27-Apr	1.23	0.40	0.83	1.42	0.41	1.02	1.19	0.36	0.83	0.10	0.08	0.02	0.11	0.08	0.02	0.37	-0.04	0.18	0.04	0.00	0.02	-0.05	-0.04	-0.01	0.01	0.00	0.01
28-Apr	1.23	0.36	0.87	1.42	0.36	1.06	1.18	0.32	0.86	0.10	0.08	0.02	0.11	0.09	0.02	0.37	-0.04	0.19	0.03	-0.01	0.02	-0.05	-0.04	-0.01	0.00	-0.01	0.01
29-Apr	0.79	0.38	0.41	0.92	0.34	0.58	0.75	0.28	0.47	0.09	0.07	0.02	0.10	0.08	0.02	0.26	-0.04	0.09	0.01	-0.01	0.02	-0.05	-0.04	-0.01	-0.01	-0.01	0.01
30-Apr	0.37	0.34	0.03	0.30	0.27	0.03	0.25	0.23	0.02	0.08	0.07	0.01	0.09	0.08	0.01	0.16	-0.05	0.01	0.00	-0.01	0.00	-0.05	-0.05	0.00	-0.01	-0.01	0.00

Date	Node 310			Node 388			Node 412			Node 421			Node 422			Node 423			Node 429			Node 434		
	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference
1-Apr	0.05	0.02	-0.03	0.52	0.46	-0.06	0.63	0.56	-0.07	0.51	0.45	-0.05	0.45	0.40	-0.05	0.36	0.32	-0.05	0.33	0.29	-0.04	0.12	0.10	-0.01
2-Apr	0.04	0.01	0.03	0.51	0.44	0.07	0.63	0.53	0.10	0.50	0.43	0.07	0.44	0.38	0.06	0.36	0.29	-0.06	0.32	0.27	-0.05	0.11	0.09	-0.01
3-Apr	0.03	0.00	0.03	0.51	0.44	0.07	0.63	0.53	0.10	0.50	0.43	0.07	0.44	0.38	0.06	0.35	0.29	-0.06	0.32	0.27	-0.05	0.10	0.09	-0.01
4-Apr	0.02	0.00	0.03	0.52	0.44	0.07	0.64	0.54	0.10	0.50	0.43	0.07	0.44	0.38	0.06	0.35	0.28	-0.06	0.31	0.26	-0.05	0.09	0.08	-0.01
5-Apr	0.01	-0.01	0.03	0.52	0.44	0.07	0.64	0.54	0.10	0.50	0.43	0.07	0.44	0.38	0.06	0.35	0.28	-0.06	0.31	0.26	-0.05	0.09	0.07	-0.01
6-Apr	0.00	-0.02	0.03	0.51	0.44	0.07	0.64	0.54	0.10	0.50	0.43	0.07	0.44	0.38	0.06	0.35	0.28	-0.06	0.30	0.25	-0.05	0.08	0.06	-0.01
7-Apr	-0.01	-0.03	0.03	0.51	0.44	0.08	0.64	0.54	0.10	0.50	0.43	0.07	0.44	0.38	0.06	0.35	0.28	-0.07	0.30	0.25	-0.05	0.06	0.05	-0.01
8-Apr	-0.02	-0.05	0.03	0.51	0.44	0.08	0.64	0.54	0.10	0.50	0.43	0.07	0.44	0.38	0.06	0.35	0.28	-0.07	0.30	0.25	-0.05	0.05	0.04	-0.01
9-Apr	-0.02	-0.05	0.03	0.51	0.44	0.08	0.65	0.55	0.10	0.51	0.44	0.07	0.45	0.38	0.06	0.35	0.29	-0.07	0.30	0.25	-0.05	0.04	0.02	-0.01
10-Apr	-0.01	-0.04	0.02	0.54	0.46	0.07	0.66	0.56	0.10	0.52	0.46	0.07	0.46	0.40	0.06	0.37	0.31	-0.06	0.31	0.26	-0.05	0.03	0.02	-0.01
11-Apr	0.03	0.00	0.02	0.58	0.50	0.07	0.67	0.57	0.10	0.54	0.47	0.07	0.48	0.42	0.06	0.40	0.34	-0.06	0.34	0.29	-0.05	0.06	0.04	-0.01
12-Apr	0.06	0																						

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Table 3. Daily Mean Velocities (ft/sec) between Base and Project Description Model Scenarios and Their Difference (Hydrology 2 minus Hydrology 1) at All Channel Nodes during May

Date	Node 6			Node 9			Node 12			Node 49			Node 50			Node 54			Node 94			Node 124			Node 148		
	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference
1-May	0.35	0.21	0.14	0.26	0.15	0.11	0.21	0.13	0.08	0.06	0.05	0.01	0.08	0.07	0.01	0.16	-0.06	0.04	-0.05	-0.03	0.01	-0.06	-0.06	0.00	-0.03	-0.03	0.00
2-May	0.33	0.12	0.21	0.24	0.05	0.18	0.19	0.05	0.14	0.06	0.04	0.01	0.07	0.06	0.01	0.16	-0.06	0.07	-0.08	-0.04	0.01	-0.07	-0.06	0.00	-0.04	-0.04	0.00
3-May	0.33	0.12	0.21	0.24	0.05	0.19	0.18	0.04	0.14	0.05	0.04	0.01	0.07	0.06	0.01	0.16	-0.07	0.07	-0.09	-0.05	0.01	-0.07	-0.07	0.00	-0.04	-0.05	0.00
4-May	0.33	0.12	0.21	0.24	0.05	0.19	0.18	0.04	0.14	0.05	0.04	0.01	0.07	0.06	0.01	0.16	-0.07	0.07	-0.09	-0.05	0.01	-0.07	-0.07	0.00	-0.05	-0.05	0.00
5-May	0.33	0.12	0.21	0.24	0.05	0.19	0.19	0.05	0.14	0.04	0.03	0.01	0.06	0.05	0.01	0.16	-0.07	0.07	-0.09	-0.06	0.01	-0.08	-0.07	0.00	-0.05	-0.06	0.00
6-May	0.33	0.12	0.21	0.24	0.05	0.19	0.19	0.05	0.14	0.02	0.01	0.01	0.04	0.03	0.01	0.16	-0.07	0.07	-0.10	-0.06	0.01	-0.08	-0.07	0.00	-0.05	-0.06	0.00
7-May	0.34	0.13	0.21	0.24	0.06	0.18	0.19	0.05	0.14	0.01	0.00	0.01	0.03	0.02	0.01	0.17	-0.07	0.07	-0.10	-0.06	0.01	-0.08	-0.07	0.00	-0.06	-0.06	0.00
8-May	0.35	0.15	0.20	0.27	0.09	0.18	0.20	0.07	0.13	0.00	-0.01	0.01	0.01	0.00	0.01	0.16	-0.07	0.07	-0.09	-0.06	0.01	-0.07	-0.07	0.00	-0.06	-0.06	0.00
9-May	0.36	0.15	0.21	0.30	0.12	0.19	0.23	0.09	0.14	0.00	-0.01	0.01	0.01	0.00	0.01	0.16	-0.06	0.07	-0.06	-0.05	0.01	-0.06	-0.06	0.00	-0.04	-0.05	0.00
10-May	0.37	0.15	0.22	0.31	0.12	0.19	0.24	0.11	0.14	0.01	0.00	0.01	0.02	0.01	0.01	0.16	-0.05	0.07	-0.04	-0.03	0.01	-0.06	-0.05	0.00	-0.03	-0.03	0.00
11-May	0.37	0.15	0.22	0.31	0.12	0.19	0.25	0.11	0.14	0.04	0.03	0.01	0.04	0.04	0.01	0.16	-0.05	0.07	-0.03	-0.03	0.01	-0.06	-0.05	0.00	-0.02	-0.02	0.00
12-May	0.36	0.14	0.22	0.30	0.11	0.19	0.24	0.10	0.14	0.08	0.05	0.01	0.07	0.06	0.01	0.16	-0.05	0.06	-0.03	-0.03	0.01	-0.06	-0.05	0.00	-0.02	-0.02	0.00
13-May	0.36	0.14	0.22	0.29	0.10	0.19	0.23	0.09	0.14	0.07	0.06	0.01	0.06	0.07	0.01	0.16	-0.05	0.06	-0.04	-0.03	0.01	-0.05	-0.05	0.00	-0.02	-0.02	0.00
14-May	0.35	0.14	0.22	0.28	0.09	0.19	0.22	0.08	0.14	0.08	0.07	0.01	0.06	0.08	0.01	0.16	-0.05	0.06	-0.04	-0.03	0.01	-0.06	-0.05	0.00	-0.03	-0.03	0.00
15-May	0.34	0.12	0.21	0.26	0.07	0.18	0.22	0.08	0.14	0.09	0.07	0.01	0.10	0.09	0.01	0.16	-0.05	0.07	-0.01	-0.03	0.01	-0.06	-0.05	0.00	-0.03	-0.03	0.00
16-May	0.32	0.11	0.21	0.23	0.05	0.18	0.21	0.07	0.14	0.09	0.08	0.01	0.11	0.10	0.01	0.16	-0.06	0.07	-0.05	-0.03	0.01	-0.06	-0.06	0.00	-0.03	-0.03	0.00
17-May	0.32	0.11	0.21	0.22	0.04	0.19	0.19	0.05	0.14	0.09	0.07	0.01	0.11	0.10	0.01	0.16	-0.07	0.07	-0.06	-0.04	0.01	-0.07	-0.07	0.00	-0.03	-0.04	0.00
18-May	0.32	0.11	0.21	0.23	0.04	0.18	0.18	0.04	0.14	0.07	0.06	0.01	0.10	0.09	0.01	0.16	-0.07	0.07	-0.09	-0.05	0.01	-0.08	-0.07	0.00	-0.05	-0.05	0.00
19-May	0.32	0.12	0.20	0.23	0.05	0.18	0.18	0.04	0.14	0.05	0.04	0.01	0.08	0.07	0.01	0.16	-0.08	0.07	-0.10	-0.06	0.01	-0.08	-0.08	0.00	-0.05	-0.06	0.00
20-May	0.32	0.12	0.21	0.23	0.05	0.19	0.19	0.05	0.14	0.02	0.01	0.01	0.04	0.03	0.01	0.17	-0.08	0.06	-0.10	-0.06	0.01	-0.08	-0.08	0.00	-0.06	-0.06	0.00
21-May	0.33	0.13	0.20	0.24	0.06	0.18	0.19	0.06	0.13	0.00	-0.01	0.01	0.02	0.01	0.01	0.17	-0.08	0.07	-0.09	-0.06	0.01	-0.08	-0.08	0.00	-0.06	-0.06	0.00
22-May	0.35	0.15	0.20	0.28	0.10	0.18	0.21	0.07	0.13	0.00	-0.01	0.01	0.01	0.00	0.01	0.16	-0.07	0.06	-0.08	-0.06	0.01	-0.07	-0.07	0.00	-0.06	-0.06	0.00
23-May	0.37	0.15	0.21	0.30	0.12	0.19	0.23	0.10	0.14	0.00	-0.01	0.01	0.01	0.00	0.01	0.16	-0.06	0.07	-0.06	-0.05	0.01	-0.06	-0.06	0.00	-0.04	-0.05	0.00
24-May	0.37	0.15	0.22	0.31	0.12	0.19	0.24	0.10	0.14	0.02	0.01	0.01	0.02	0.01	0.01	0.16	-0.05	0.07	-0.05	-0.03	0.01	-0.05	-0.05	0.00	-0.02	-0.02	0.00
25-May	0.37	0.15	0.22	0.31	0.12	0.19	0.24	0.10	0.14	0.04	0.03	0.01	0.04	0.03	0.01	0.16	-0.05	0.06	-0.04	-0.03	0.01	-0.05	-0.05	0.00	-0.03	-0.03	0.00
26-May	0.37	0.15	0.23	0.30	0.11	0.19	0.23	0.09	0.14	0.05	0.04	0.01	0.06	0.05	0.01	0.16	-0.05	0.06	-0.05	-0.03	0.01	-0.05	-0.05	0.00	-0.03	-0.03	0.00
27-May	0.36	0.14	0.23	0.29	0.09	0.19	0.22	0.08	0.14	0.06	0.05	0.01	0.06	0.05	0.01	0.16	-0.05	0.06	-0.06	-0.03	0.01	-0.05	-0.05	0.00	-0.03	-0.03	0.00
28-May	0.36	0.13	0.22	0.28	0.08	0.19	0.21	0.07	0.14	0.06	0.05	0.01	0.07	0.06	0.01	0.16	-0.05	0.07	-0.05	-0.03	0.01	-0.05	-0.05	0.00	-0.02	-0.02	0.00
29-May	0.35	0.13	0.22	0.27	0.07	0.19	0.21	0.06	0.14	0.06	0.05	0.01	0.07	0.06	0.01	0.16	-0.05	0.07	-0.06	-0.04	0.01	-0.06	-0.05	0.00	-0.03	-0.04	0.00
30-May	0.33	0.12	0.21	0.26	0.07	0.19	0.21	0.06	0.14	0.06	0.05	0.01	0.07	0.06	0.01	0.16	-0.06	0.07	-0.06	-0.04	0.01	-0.06	-0.06	0.00	-0.03	-0.04	0.00
31-May	0.27	0.15	0.12	0.20	0.09	0.11	0.15	0.09	0.09	0.06	0.05	0.01	0.07	0.07	0.01	0.14	-0.06	0.04	-0.05	-0.03	0.01	-0.06	-0.05	0.00	-0.03	-0.02	0.00

Date	Node 310			Node 388			Node 412			Node 421			Node 422			Node 423			Node 428			Node 434		
	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference
1-May	0.00	0.00	0.00	0.71	0.51	0.21	0.88	0.61	0.26	0.69	0.50	0.20	0.61	0.44	0.17	0.52	0.35	-0.17	0.45	0.32	-0.13	0.12	0.09	-0.03
2-May	-0.01	-0.01	0.00	0.70	0.50	0.20	0.87	0.61	0.26	0.69	0.49	0.19	0.61	0.44	0.17	0.51	0.34	-0.17	0.44	0.31	-0.13	0.12	0.09	-0.03
3-May	-0.01	-0.01	0.00	0.70	0.50	0.20	0.87	0.62	0.25	0.68	0.49	0.19	0.60	0.44	0.17	0.50	0.34	-0.17	0.44	0.31	-0.13	0.12	0.09	-0.03
4-May	-0.01	-0.01	0.00	0.70	0.50	0.20	0.88	0.62	0.26	0.68	0.49	0.19	0.60	0.44	0.17	0.50	0.33	-0.17	0.44	0.31	-0.13	0.12	0.09	-0.03
5-May	-0.02	-0.02	0.00	0.70	0.50	0.20	0.88	0.62	0.26	0.68	0.49	0.19	0.60	0.43	0.17	0.50	0.33	-0.17	0.43	0.30	-0.13	0.11	0.09	-0.02
6-May	-0.04	-0.04	0.00	0.70	0.50	0.20	0.88	0.62	0.26	0.68	0.49	0.19	0.60	0.43	0.17	0.50	0.33	-0.17	0.43	0.29	-0.13	0.09	0.07	-0.01
7-May	-0.05	-0.05	0.00	0.70	0.50	0.20	0.88	0.62	0.26	0.69	0.50	0.19	0.61	0.44	0.17	0.50	0.33	-0.17	0.42	0.29	-0.13	0.08	0.05	-0.03
8-May	-0.06	-0.06	0.00	0.70	0.50	0.20	0.89	0.63	0.26	0.69	0.50	0.19	0.61	0.44	0.17	0.50	0.33	-0.17	0.42	0.29	-0.13	0.06	0.04	-0.01
9-May	-0.06	-0.06	0.00	0.71	0.52	0.20	0.90	0.64	0.25	0.70	0.52	0.18	0.62	0.46	0.16	0.51	0.35	-0.16	0.42	0.30	-0.12	0.05	0.03	-0.02
10-May	-0.03	-0.04	0.00	0.75	0.55	0.19	0.91	0.66	0.25	0.72	0.54	0.18	0.63	0.47	0.16	0.53	0.37	-0.16	0.44	0.31	-0.12	0.06	0.04	-0.02
11-May	-0.01	-0.01	0.00	0.77	0.57	0.20	0.92	0.67	0.25	0.73	0.55	0.18	0.65	0.48	0.16	0.56	0.39	-0.16	0.46	0.33	-0.13	0.08	0.06	-0.02
12-May	0.01	0.01	0.00	0.78	0.57	0.21	0.93	0.67	0.25	0.74	0.55	0.19	0.65	0.49	0.16	0.57	0.40	-0.17	0.46	0.34	-0.12	0.10	0.08	-0.01
13-May	0.02	0.01	0.00	0.78	0.57	0.21	0.92	0.67	0.25	0.73	0.55	0.19	0.65	0.48	0.16	0.57	0.40	-0.17	0.46	0.35	-0.12	0.12	0.10	-0.02
14-May	0.02	0.02	0.00	0.77	0.57	0.21	0.91	0.66	0.25	0.73	0.54	0.19	0.65	0.48	0.17	0.56	0.40	-0.16	0.48	0.35	-0.13	0.13	0.11	-

Attachment 2. Biological Review for Endangered Species Act Compliance with the WY 2015 Drought Contingency Plan April through September
Project Description

Table 4. Daily Mean Flows (cfs) Between Base and Project Description Model Scenarios and Their Difference (Hydrology 2 minus Hydrology 1) at All Channel Nodes During April

Date	Node 6			Node 9			Node 12			Node 49			Node 50			Node 54			Node 94			Node 124			Node 148		
	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference
1-Apr	2984	662	2322	2235	333	1902	2165	299	1866	5024	3052	-1972	5393	3321	-2072	629	269	-360	-404	-678	-274	-2329	-2137	192	-334	-447	-113
2-Apr	3064	865	2199	2407	497	1910	2378	460	1918	4282	2379	-1903	4567	2564	-2004	637	326	-311	-563	-727	-164	-2496	-2221	276	-428	-489	-61
3-Apr	3067	973	2094	2411	594	1817	2382	561	1820	3729	1928	-1800	4023	2126	-1897	637	354	-283	-512	-651	-139	-2534	-2259	275	-413	-464	-51
4-Apr	3067	974	2093	2414	600	1814	2382	565	1818	3132	1345	-1787	3489	1605	-1884	634	347	-287	-441	-590	-149	-2578	-2306	271	-385	-442	-57
5-Apr	3069	976	2093	2419	610	1809	2387	573	1814	2498	706	-1793	2901	1014	-1886	632	342	-290	-394	-549	-156	-2583	-2319	264	-369	-429	-60
6-Apr	3071	977	2093	2420	610	1810	2388	573	1815	1556	-251	-1807	1766	-130	-1896	634	342	-291	-448	-605	-157	-2640	-2378	262	-405	-466	-62
7-Apr	3073	981	2092	2422	608	1814	2391	573	1818	736	-1081	-1817	579	-1323	-1902	636	349	-287	-454	-609	-156	-2672	-2407	265	-415	-475	-60
8-Apr	3077	982	2095	2430	615	1814	2393	574	1819	-73	-1900	-1827	-568	-2483	-1915	633	343	-290	-479	-637	-158	-2692	-2430	262	-447	-509	-61
9-Apr	3083	1000	2083	2444	644	1799	2402	596	1806	-525	-2334	-1809	-1182	-3077	-1894	631	336	-295	-396	-554	-158	-2486	-2229	257	-435	-495	-61
10-Apr	3086	1023	2063	2460	706	1754	2430	675	1755	-39	-1789	-1750	-721	-2567	-1846	627	329	-298	-169	-328	-159	-2098	-1854	245	-297	-356	-60
11-Apr	3083	1023	2060	2466	719	1747	2457	716	1742	2533	803	-1729	1734	-85	-1819	623	325	-298	76	-87	-163	-1875	-1650	225	-101	-165	-64
12-Apr	3075	1010	2066	2455	700	1755	2460	706	1754	5115	3338	-1777	4676	2811	-1864	622	326	-296	109	-53	-162	-1896	-1657	238	-64	-127	-64
13-Apr	3069	998	2071	2440	674	1766	2435	671	1764	6353	4545	-1808	6307	4403	-1904	622	328	-294	97	-62	-160	-1840	-1598	241	-71	-134	-63
14-Apr	3062	977	2085	2427	648	1779	2419	638	1781	6723	4898	-1826	6940	5019	-1921	623	334	-289	9	-145	-154	-1894	-1640	253	-116	-177	-61
15-Apr	3059	963	2096	2414	608	1806	2419	625	1794	6665	4830	-1835	7056	5127	-1929	627	342	-285	-69	-222	-154	-2087	-1820	267	-159	-220	-60
16-Apr	3059	961	2097	2404	582	1822	2395	585	1809	6353	4516	-1837	6797	4868	-1929	630	348	-282	-196	-347	-151	-2354	-2080	274	-229	-288	-58
17-Apr	3060	964	2097	2405	583	1822	2377	555	1822	6025	4191	-1834	6481	4553	-1928	631	348	-283	-304	-454	-150	-2511	-2240	271	-287	-344	-57
18-Apr	3062	965	2097	2406	584	1822	2370	544	1827	5006	3189	-1818	5592	3675	-1917	632	347	-284	-457	-609	-152	-2705	-2431	274	-393	-450	-57
19-Apr	3065	968	2097	2411	588	1822	2372	545	1828	3233	1432	-1801	4016	2111	-1905	633	348	-285	-517	-672	-135	-2864	-2594	270	-448	-508	-59
20-Apr	3069	972	2097	2417	596	1821	2381	553	1828	1173	-629	-1802	1627	-261	-1887	632	346	-286	-522	-678	-156	-2918	-2651	268	-461	-521	-60
21-Apr	3074	977	2097	2426	602	1824	2391	561	1830	-111	-1941	-1830	-376	-2291	-1915	631	346	-285	-517	-672	-155	-2939	-2670	269	-468	-528	-59
22-Apr	3081	985	2097	2438	613	1825	2396	566	1829	-816	-2643	-1827	-1493	-3408	-1915	630	346	-284	-502	-657	-155	-2843	-2577	266	-485	-545	-60
23-Apr	3089	1017	2072	2459	673	1786	2416	622	1794	-829	-2625	-1796	-1537	-3421	-1846	626	336	-290	-353	-506	-153	-2459	-2200	259	-426	-485	-59
24-Apr	3091	1030	2061	2475	722	1753	2453	705	1748	670	-1069	-1738	-66	-1904	-1838	623	330	-293	-19	-177	-158	-1967	-1730	237	-187	-248	-61
25-Apr	3086	1025	2060	2473	721	1752	2472	725	1747	3694	1951	-1743	2944	1114	-1830	624	328	-296	150	-12	-162	-1786	-1559	227	-41	-105	-64
26-Apr	3078	1012	2066	2455	702	1753	2463	710	1753	5824	4035	-1789	5550	3672	-1877	627	327	-300	162	-1	-164	-1710	-1477	233	-21	-85	-65
27-Apr	3072	1003	2069	2437	679	1759	2435	678	1757	6482	4669	-1813	6593	4686	-1907	630	329	-301	74	-89	-163	-1681	-1447	234	-72	-136	-64
28-Apr	3067	898	2169	2427	597	1830	2416	589	1827	6339	4493	-1846	6656	4713	-1943	631	314	-318	-47	-216	-169	-1767	-1525	242	-141	-207	-67
29-Apr	1712	748	964	1456	470	986	1501	466	1035	5488	3877	-1611	5849	4156	-1692	434	283	-151	-203	-329	-126	-1890	-1679	211	-214	-268	-54
30-Apr	670	616	53	398	361	37	404	366	37	4128	3417	-711	4406	3661	-745	259	246	-13	-228	-253	25	-1934	-1801	133	-220	-231	-11

Date	Node 310			Node 388			Node 412			Node 421			Node 422			Node 423			Node 429			Node 434		
	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference
1-Apr	152	-271	-423	879	773	-105	6492	5720	-772	3956	3531	-425	3968	3543	-424	2178	1862	-315	2247	1932	-315	6978	5912	-1066
2-Apr	2	-393	-396	873	738	-134	6498	5505	-993	3923	3364	-559	3925	3367	-558	2124	1733	-390	2170	1780	-390	6140	4945	-1195
3-Apr	-90	-459	-369	872	731	-141	6501	5481	-1020	3907	3312	-595	3902	3307	-595	2094	1686	-407	2123	1716	-407	5499	4289	-1210
4-Apr	-198	-565	-367	877	736	-141	6548	5528	-1020	3920	3325	-595	3910	3315	-595	2085	1676	-408	2101	1693	-408	4954	3753	-1201
5-Apr	-327	-695	-368	877	736	-142	6556	5535	-1021	3921	3324	-597	3907	3310	-597	2078	1667	-411	2072	1662	-410	4389	3187	-1202
6-Apr	-495	-866	-371	874	731	-142	6559	5535	-1023	3918	3319	-600	3902	3302	-600	2070	1657	-413	2031	1618	-413	3469	2263	-1206
7-Apr	-621	-992	-371	869	727	-142	6556	5529	-1028	3918	3316	-601	3899	3298	-602	2072	1656	-416	2000	1583	-417	2400	1189	-1211
8-Apr	-759	-1131	-371	870	727	-143	6600	5569	-1031	3953	3350	-603	3934	3331	-603	2088	1667	-421	1998	1578	-420	1415	194	-1221
9-Apr	-824	-1192	-368	869	727	-142	6649	5631	-1018	3978	3383	-595	3959	3365	-594	2106	1690	-416	2004	1591	-413	597	-612	-1209
10-Apr	-621	-975	-354	912	779	-133	6775	5768	-1007	4106	3545	-562	4084	3522	-562	2223	1833	-391	2091	1697	-393	394	-773	-1167
11-Apr	-37	-384	-346	989	855	-134	6872	5860	-1011	4262	3696	-566	4251	3688	-563	2424	2031	-394	2316	1928	-389	2265	1111	-1154
12-Apr	416	56	-360	996	861	-135	6893	5885	-1008	4288	3714	-574	4288	3714	-573	2496	2094	-403	2448	2047	-401	4975	3796	-1179
13-Apr	586	218	-368	989	853	-136	6872	5883	-989	4262	3681	-581	4267	3685	-581	2486	2081	-405	2487	2082	-405	6662	5463	-1199
14-Apr	579	205	-373	971	834	-137	6749	5752	-997	4207	3621	-586	4213	3626	-587	2424	2019	-405	2448	2043	-405	7466	6260	-1205
15-Apr	508	131	-377	953	815	-138	6655	5644	-1011	4147	3559	-587	4153	3564	-588	2346	1945	-402	2385	1981	-404	7765	6559	-1207
16-Apr	387	9	-378	934	796	-138	6616	5598	-1018	4074	3485	-588	4086	3496	-590	2260	1860	-400	2335	1933	-402	7838	6630	-1208
17-Apr	262	-116	-379	909	769	-141	6607	5586	-1020	3998	3407	-591	4014	3423	-591	2176	1779	-397	2266	1867	-399	7741	6529	-1212
18-Apr	62	-313	-375	898	755	-143	6610	5588	-1022	3946	3350	-596	3949	3354	-595	2085	1686	-399	2172	1773	-400	6988	5782	-

Attachment 2. Biological Review for Endangered Species Act Compliance with the WY 2015 Drought Contingency Plan April through September
Project Description

Table 5. Daily Mean Flows (cfs) Between Base and Project Description Model Scenarios and Their Difference (Hydrology 2 minus Hydrology 1) at All Channel Nodes During May

Date	Node 6			Node 9			Node 12			Node 49			Node 50			Node 54			Node 94			Node 124			Node 148		
	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference
1-May	625	374	-255	335	170	-165	317	157	-159	2567	2234	-733	3114	2348	-766	263	189	-74	-591	-626	-35	-2226	-2084	136	-595	-411	-15
2-May	610	201	-409	306	24	-282	269	-11	-280	2354	1494	-960	2419	1519	-899	264	138	-126	-819	-888	-69	-2442	-2109	133	-509	-539	-29
3-May	608	195	-414	303	14	-289	255	-34	-289	2148	1295	-853	2290	1395	-896	263	138	-125	-913	-969	-56	-2562	-2422	140	-572	-595	-23
4-May	910	197	-713	309	13	-291	253	-36	-291	1801	955	-845	2281	1268	-993	263	140	-123	-963	-1022	-61	-2862	-2522	140	-618	-641	-25
5-May	613	201	-412	309	17	-292	256	-35	-292	812	-4	-817	1326	469	-856	264	143	-120	-967	-1049	-82	-2736	-2599	137	-648	-674	-26
6-May	617	203	-415	309	16	-293	259	-31	-290	-599	-1432	-833	-398	-1263	-865	268	151	-117	-1010	-1074	-64	-2788	-2656	132	-673	-701	-28
7-May	522	215	-307	313	25	-287	262	-23	-283	-1619	-2457	-838	-1838	-2809	-972	275	157	-118	-1013	-1076	-64	-2786	-2656	131	-694	-722	-28
8-May	645	251	-394	350	76	-274	287	8	-280	-2187	-3036	-948	-2798	-3677	-880	267	152	-115	-948	-1012	-64	-2818	-2490	138	-685	-713	-28
9-May	665	261	-404	403	118	-285	352	67	-284	-2122	-2946	-824	-2821	-3681	-860	261	142	-119	-759	-824	-64	-2314	-2192	122	-576	-604	-28
10-May	668	259	-409	413	129	-284	386	103	-284	-926	-1728	-802	-1852	-2702	-850	262	136	-126	-583	-651	-68	-2682	-1949	113	-417	-447	-30
11-May	661	258	-403	407	124	-283	394	110	-283	1273	462	811	513	518	851	280	132	-128	-496	-565	-69	-2025	-1913	112	-348	-378	-30
12-May	649	227	-422	390	107	-281	379	96	-283	2889	2056	-833	2287	1395	-892	260	131	-129	-492	-561	-69	-2015	-1888	117	-344	-373	-30
13-May	644	231	-413	371	89	-283	351	65	-283	3736	2884	-852	3466	2572	-894	261	130	-131	-535	-603	-69	-2004	-1882	122	-569	-598	-29
14-May	634	224	-409	358	73	-285	331	48	-284	4228	3356	-872	4270	3356	-914	264	134	-121	-577	-646	-69	-2048	-1920	128	-395	-425	-30
15-May	606	195	-411	329	47	-283	318	32	-286	4357	3476	-881	4650	3727	-924	264	135	-129	-612	-679	-67	-2193	-2056	137	-419	-449	-30
16-May	599	184	-415	293	6	-287	291	4	-287	4327	3439	-888	4747	3817	-930	266	140	-126	-664	-729	-65	-2418	-2275	142	-449	-477	-28
17-May	599	184	-415	284	-8	-292	245	-45	-290	4027	3145	-882	4475	3550	-925	267	143	-124	-622	-682	-60	-2639	-2494	144	-528	-553	-26
18-May	603	188	-415	287	-6	-293	230	-63	-293	3043	2184	-859	3680	2773	-907	268	145	-123	-986	-1048	-62	-2819	-2674	146	-641	-666	-26
19-May	608	195	-413	295	1	-294	237	-59	-293	977	336	921	1739	871	-868	268	149	-119	-1058	-1116	-61	-2950	-2812	139	-703	-727	-27
20-May	616	200	-415	301	7	-294	248	-41	-290	-1088	-1512	-824	-915	-1775	-856	273	158	-115	-1071	-1134	-63	-2973	-2841	131	-721	-749	-28
21-May	625	224	-401	314	30	-284	261	-22	-281	-1569	-2802	-833	-2416	-3261	-846	277	160	-117	-1021	-1085	-64	-2886	-2741	136	-712	-741	-29
22-May	656	260	-396	369	93	-276	303	23	-281	-2176	-3006	-830	-2819	-3681	-862	266	152	-114	-926	-991	-64	-2589	-2468	122	-677	-705	-28
23-May	671	266	-405	411	125	-286	366	80	-285	-1732	-2539	-807	-2398	-3243	-845	263	141	-119	-735	-799	-64	-2318	-2104	113	-546	-574	-28
24-May	666	261	-405	415	132	-283	391	108	-283	-1722	-1151	-779	-1193	-2617	-825	262	135	-127	-579	-648	-69	-1922	-1819	102	-394	-423	-30
25-May	662	251	-410	408	125	-283	393	110	-283	1462	697	764	693	-129	-822	259	130	-128	-516	-586	-71	-1842	-1741	100	-341	-373	-30
26-May	650	229	-421	392	107	-285	378	93	-285	2002	1501	-502	2121	1282	-938	257	129	-128	-841	-910	-69	-1835	-1731	104	-337	-366	-29
27-May	619	228	-391	373	87	-286	334	68	-287	2904	2083	-821	2867	1830	-1038	256	128	-128	-618	-687	-69	-1898	-1788	108	-403	-432	-29
28-May	655	226	-425	361	74	-287	333	45	-288	3058	2234	-823	2976	2103	-874	255	127	-128	-554	-625	-71	-1932	-1822	110	-372	-402	-30
29-May	628	216	-412	348	58	-290	314	24	-290	2781	1945	-836	2771	1895	-876	256	131	-126	-602	-670	-68	-2105	-1988	117	-447	-475	-29
30-May	611	201	-410	337	46	-290	309	17	-291	3823	1964	-1859	2892	2011	-880	258	133	-125	-711	-776	-65	-2245	-2121	123	-455	-483	-28
31-May	489	262	-223	249	71	-177	242	57	-186	2529	2053	-475	2681	2179	-512	231	158	-74	-709	-765	-56	-2238	-2198	37	-458	-488	-35

Date	Node 310			Node 388			Node 412			Node 421			Node 422			Node 423			Node 429			Node 434		
	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference	Hydr #1	Hydr #2	Difference
1-May	434	-415	15	1252	859	-393	5151	6413	-2737	5491	3887	-1604	5495	3887	-1608	3187	2106	-1081	3218	2128	-1067	7582	5325	-2257
2-May	570	-593	-14	1234	848	-386	5140	6435	-2705	5449	3886	-1369	5451	3882	-1569	3118	2056	-1061	3149	2094	-1045	7286	5049	-2237
3-May	634	-647	-13	1232	844	-388	5185	6478	-2706	5447	3871	-1575	5444	3870	-1574	3085	2021	-1064	3119	2053	-1066	7258	5017	-2241
4-May	694	-705	-11	1219	850	-389	5240	6532	-2708	5462	3883	-1580	5453	3873	-1579	3067	1997	-1070	3100	2030	-1069	7089	4851	-2238
5-May	689	-694	-5	1240	851	-389	5252	6541	-2711	5466	3881	-1585	5450	3865	-1585	3045	1970	-1075	3054	1981	-1073	6300	4804	-2215
6-May	1150	-1158	-8	1227	849	-389	5259	6540	-2711	5472	3884	-1586	5452	3869	-1589	3036	1956	-1080	2992	1911	-1081	4812	2611	-2221
7-May	1327	-1333	-6	1240	851	-389	5311	6585	-2726	5506	3920	-1586	5483	3898	-1586	3051	1994	-1089	2973	1886	-1086	3428	1196	-2228
8-May	1415	-1426	-11	1236	849	-388	5338	6626	-2711	5522	3944	-1577	5498	3922	-1576	3061	1971	-1089	2957	1875	-1082	2332	134	-2218
9-May	1314	-1329	-16	1253	877	-376	5450	6772	-2670	5587	4068	-1519	5561	4042	-1519	3122	2066	-1094	2987	1916	-1090	1791	-456	-2157
10-May	994	-1013	-19	1213	847	-366	5536	6867	-2669	5699	4223	-1476	5673	4203	-1476	3257	2241	-1017	3122	2099	-1014	2243	118	-2125
11-May	608	-615	-7	1353	972	-381	5625	6954	-2671	5812	4315	-1497	5797	4304	-1493	3421	2372	-1049	3306	2265	-1041	4221	2067	-2155
12-May	568	-574	-6	1368	979	-380	5665	7007	-2607	5850	4335	-1511	5840	4335	-1511	3483	2423	-1055	3420	2362	-1056	6190	3965	-2205
13-May	274	-283	-9	1367	973	-395	5616	6974	-2642	5831	4303	-1529	5831	4302	-1530	3461	2403	-1058	3446	2386	-1060	7507	5278	-2229
14-May	231	-248	-15	1396	971	-394	5581	6923	-2657	5822	4277	-1543	5823	4277	-1547									

Table 6. DSM2 Results for Mean Daily Proportion Positive Flows, Mean Daily Flow, and Mean Daily Velocity at Each Channel Node for April. Differences are calculated as Hydrology 2 or 2¹ minus Hydrology 1

Channel Nodes		Proportion Positive Daily Flow					Average Daily Flow (cfs)					Mean Daily Velocity (ft/s)				
		Baseline	Proposed	Difference between Baseline and Proposed	Proposed (DCC Open)	Difference between Baseline and Proposed (Open)	Baseline	Proposed	Difference between Baseline and Proposed	Proposed (DCC Open)	Difference between Baseline and Proposed (Open)	Baseline	Proposed	Difference between Baseline and Proposed	Proposed (DCC Open)	Difference Between Proposed and Proposed DCC Open
6	San Joaquin	0.99	0.89	-0.10	0.89	-0.01	2943	951	-1993	951	0.0	1.16	0.38	-0.78	0.38	0.00
9	San Joaquin	0.98	0.63	-0.35	0.63	0.00	2325	608	-1717	607	-0.4	1.33	0.36	-0.97	0.36	0.00
12	South Delta	0.98	0.58	-0.39	0.58	0.00	2303	585	-1718	585	-0.4	1.11	0.32	-0.79	0.32	0.00
49	Central Delta	0.53	0.53	0.00	0.53	0.00	3344	1576	-1768	2124	547.4	0.07	0.05	-0.02	0.05	0.01
50	Central Delta	0.53	0.52	0.00	0.53	0.00	3331	1473	-1858	2050	576.3	0.08	0.06	-0.02	0.07	0.01
54	San Joaquin	1.00	0.97	-0.03	0.96	0.00	610	330	-280	331	0.4	0.35	0.19	-0.16	0.19	0.00
94	South Delta	0.52	0.52	0.00	0.52	0.00	-251	-406	-155	-404	2.0	0.00	-0.02	-0.02	-0.02	0.00
124	South Delta	0.46	0.46	0.00	0.47	0.00	-2302	-2053	249	-2209	-155.2	-0.06	-0.06	0.01	-0.06	0.00
148	South Delta	0.52	0.52	0.00	0.52	0.00	-285	-345	-60	-348	-2.3	-0.01	-0.02	-0.01	-0.02	0.00
310	Central Delta	0.52	0.52	-0.01	0.52	0.00	-110	-461	-351	-261	199.3	0.03	0.00	-0.02	0.02	0.01
388	North Delta	0.65	0.62	-0.03	0.61	-0.02	943	787	-156	683	-103.9	0.55	0.47	-0.08	0.41	-0.06
412	North Delta	0.94	0.85	-0.09	0.84	-0.01	6856	5726	-1130	5727	0.5	0.66	0.56	-0.11	0.56	0.00
421	North Delta	0.71	0.66	-0.05	0.69	0.02	4163	3515	-648	3825	310.7	0.53	0.45	-0.08	0.49	0.04
422	North Delta	0.70	0.66	-0.04	0.61	-0.05	4157	3509	-648	2636	-872.8	0.47	0.40	-0.07	0.30	-0.10
423	North Delta	0.62	0.59	-0.02	0.57	-0.02	2303	1854	-449	1376	-478.1	0.38	0.31	-0.07	0.24	-0.08
429	North Delta	0.59	0.57	-0.02	0.56	-0.01	2284	1836	-448	1359	-476.8	0.34	0.28	-0.06	0.22	-0.06
434	North Delta	0.53	0.53	0.00	0.53	0.00	4689	3418	-1271	2839	-579.0	0.09	0.07	-0.01	0.07	-0.01

Table 7. DSM2 Results for Mean Daily Proportion Positive Flows, Mean Daily Flow, and Mean Daily Velocity at Each Channel Node for May. Differences are calculated as Hydrology 2 or 2¹ minus Hydrology 1

Channel Nodes		Proportion Positive Daily Flow					Average Daily Flow (cfs)					Mean Daily Velocity (ft/s)				
		Baseline	Proposed	Difference between Baseline and Proposed	Proposed (DCC Open)	Difference between Baseline and Proposed (Open)	Baseline	Proposed	Difference between Baseline and Proposed	Proposed (DCC Open)	Difference between Baseline and Proposed (Open)	Baseline	Proposed	Difference between Baseline and Proposed	Proposed (DCC Open)	Difference Between Proposed and Proposed DCC Open
6	San Joaquin	0.72	0.57	-0.15	0.57	0	627	228	-399	228	0	0.34	0.14	-0.21	0.14	0.00
9	San Joaquin	0.59	0.55	-0.04	0.55	0	343	64	-279	64	0	0.26	0.08	-0.18	0.08	0.00
12	South Delta	0.56	0.53	-0.03	0.53	0	308	30	-279	30	0	0.21	0.07	-0.14	0.07	0.00
49	Central Delta	0.52	0.52	0	0.53	0.01	1365	545	-820	1292	747	0.04	0.03	-0.01	0.04	0.01
50	Central Delta	0.52	0.52	0	0.52	0	1231	372	-859	1157	785	0.06	0.05	-0.01	0.06	0.01
54	San Joaquin	0.9	0.78	-0.12	0.77	-0.01	263	142	-120	142	0	0.16	0.09	-0.07	0.09	0.00
94	South Delta	0.51	0.5	-0.01	0.5	0	-758	-822	-64	-819	3	-0.07	-0.07	-0.01	-0.07	0.00
124	South Delta	0.46	0.46	0	0.46	0	-2352	-2230	122	-2435	-204	-0.06	-0.06	0.00	-0.07	-0.01
148	South Delta	0.51	0.51	0	0.51	0	-512	-539	-28	-543	-3	-0.04	-0.04	0.00	-0.04	0.00
310	Central Delta	0.51	0.51	0	0.52	0.01	-734	-745	-11	-476	269	-0.02	-0.02	0.00	0.00	0.02
388	North Delta	0.73	0.65	-0.08	0.62	-0.03	1311	929	-383	791	-138	0.74	0.54	-0.20	0.47	-0.07
412	North Delta	1	0.95	-0.05	0.95	0	9525	6911	-2614	6911	0	0.91	0.66	-0.25	0.66	0.00
421	North Delta	0.86	0.72	-0.14	0.75	0.03	5686	4187	-1499	4596	409	0.71	0.53	-0.18	0.58	0.05
422	North Delta	0.84	0.71	-0.13	0.63	-0.08	5677	4178	-1499	3078	-1100	0.63	0.47	-0.16	0.35	-0.12
423	North Delta	0.68	0.62	-0.06	0.59	-0.03	3281	2247	-1034	1604	-643	0.54	0.37	-0.16	0.27	-0.10
429	North Delta	0.63	0.59	-0.04	0.57	-0.02	3253	2219	-1035	1575	-644	0.46	0.33	-0.13	0.25	-0.08
434	North Delta	0.53	0.53	0	0.53	0	5980	3805	-2175	3021	-784	0.10	0.08	-0.02	0.07	-0.01

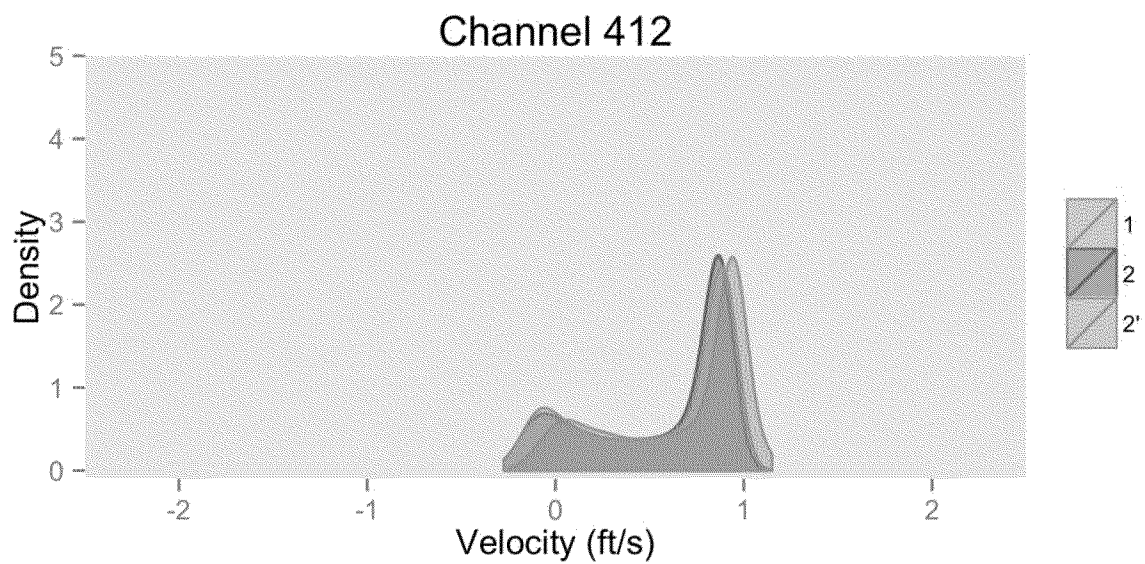


Figure 2. Density plot of velocity (ft/s) observed at DSM2 Channel Node 412 under three scenarios during the April modeled period (Sacramento River near Sherwood Harbor, North Delta)

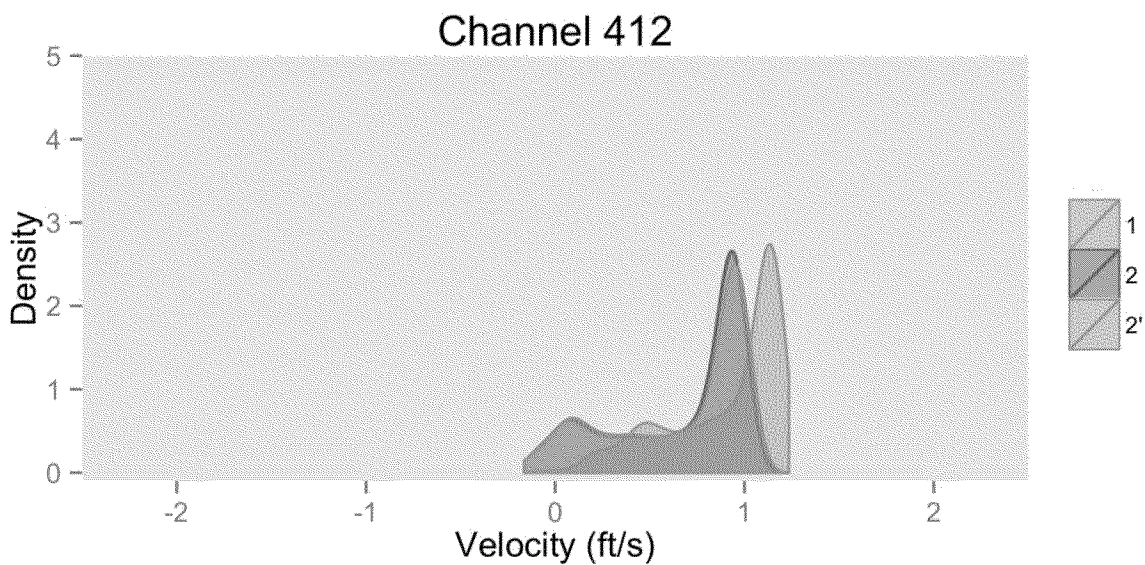


Figure 3. Density plot of velocity (ft/s) observed at DSM2 Channel Node 412 under three scenarios during the May modeled period (Sacramento River near Sherwood Harbor, North Delta)

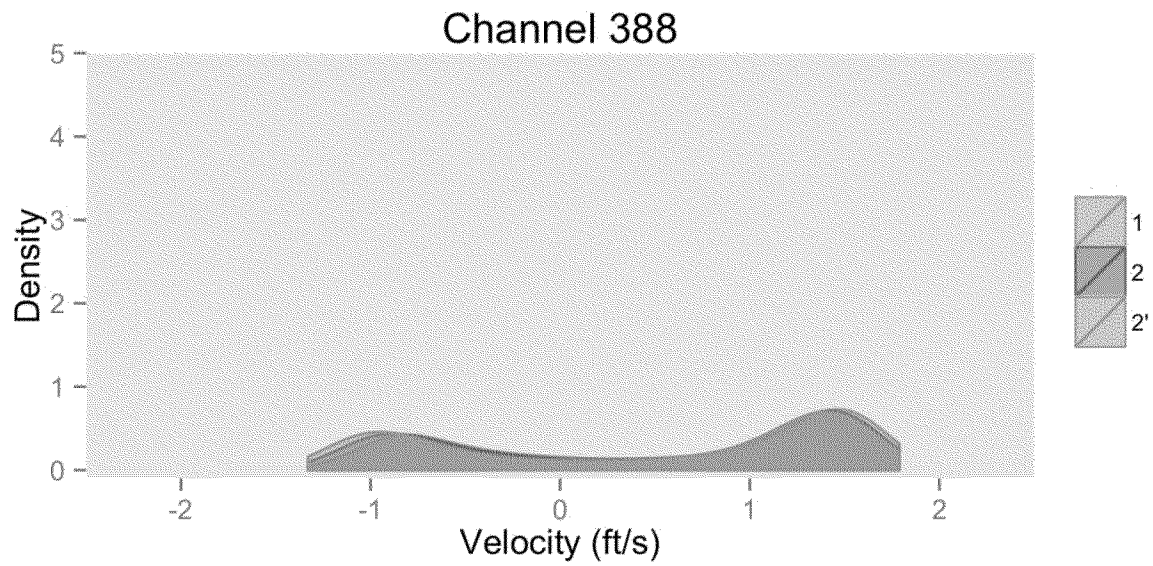


Figure 4. Density plot of velocity (ft/s) observed for DSM2 Channel 388, Sutter Slough and Sacramento River junction, in April

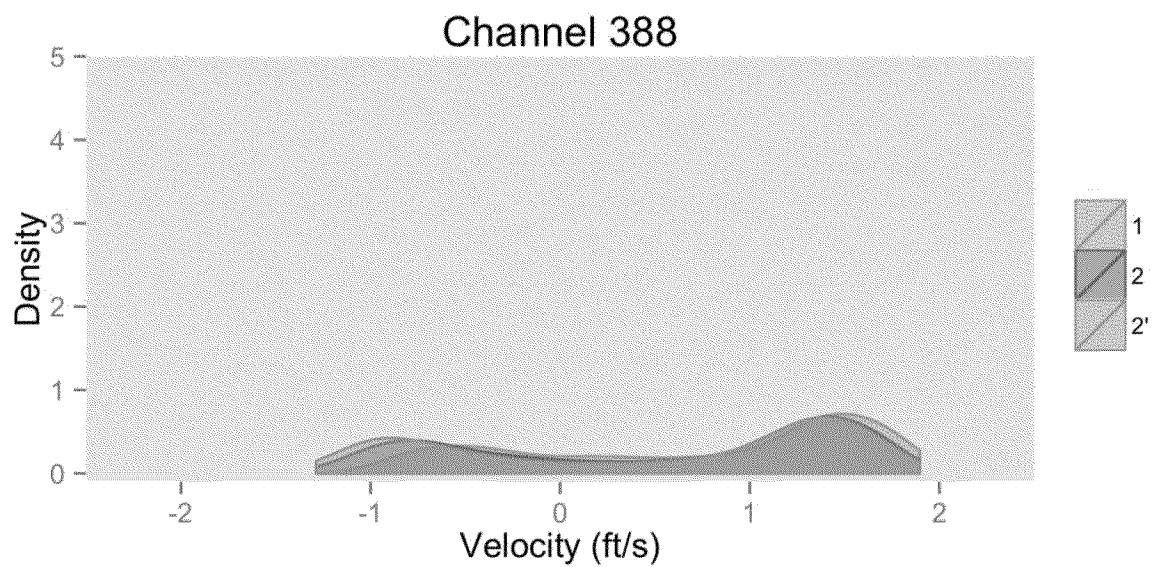


Figure 5. Density plot of velocity (ft/s) observed for DSM2 Channel 388, Sutter Slough and Sacramento River junction, in May

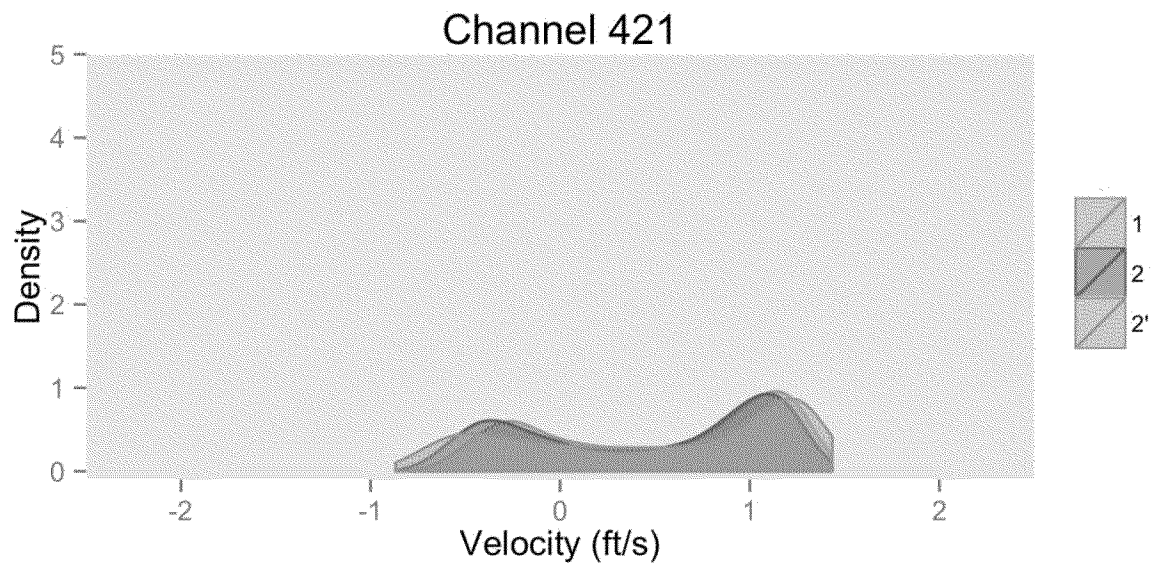


Figure 6. Density plot of velocity (ft/s) observed for DSM2 Channel 421, upstream of the DCC channel junction, in April

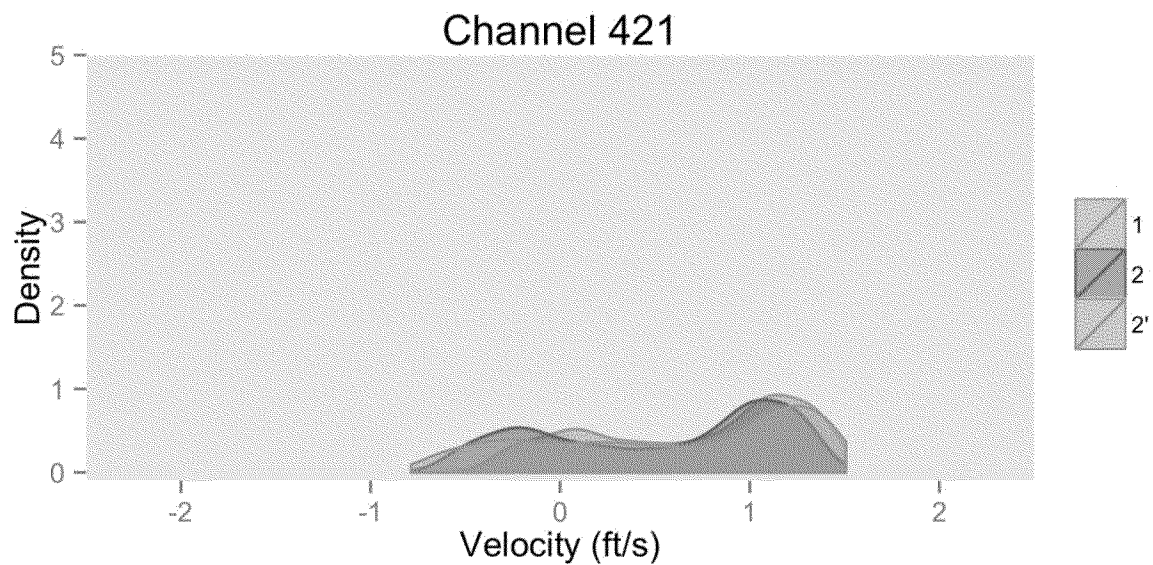


Figure 7. Density plot of velocity (ft/s) observed for DSM2 Channel 421, upstream of the DCC channel junction, in May

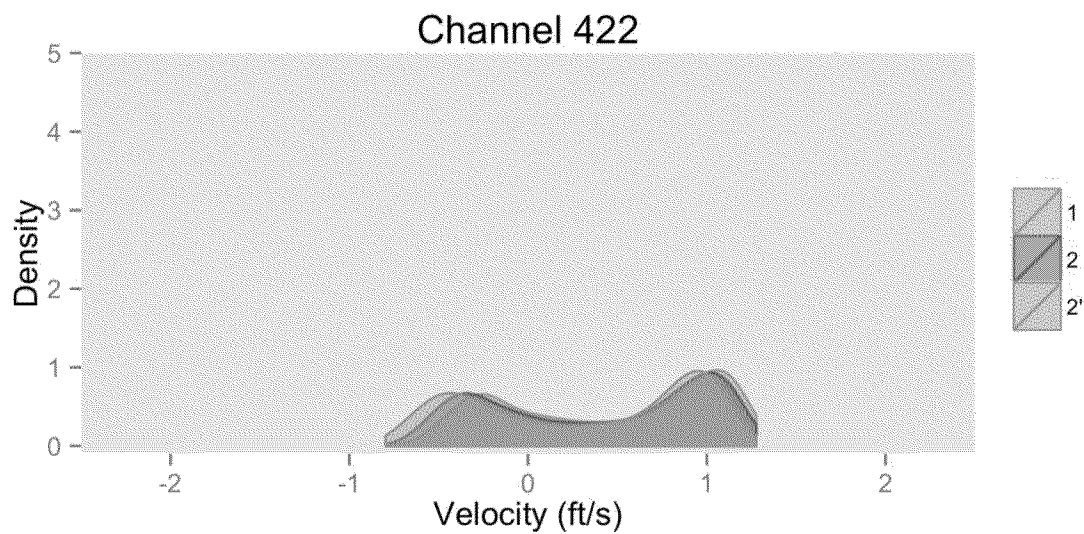


Figure 8. Density plot of velocity (ft/s) observed for DSM2 Channel 422, Sacramento River between Delta Cross Channel and Georgiana Slough in April

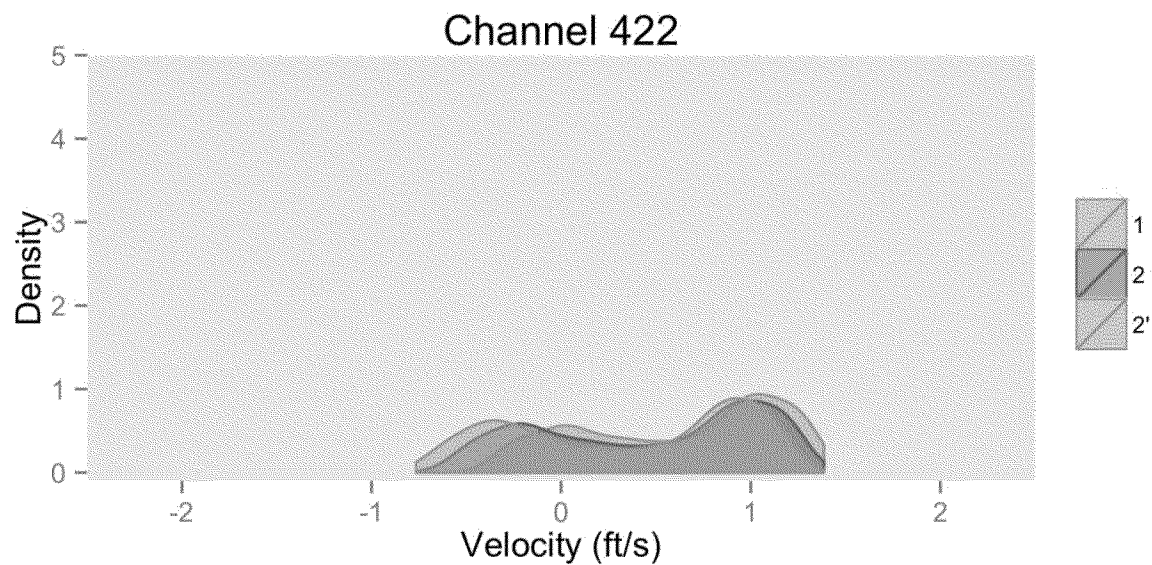


Figure 9. Density plot of velocity (ft/s) observed for DSM2 Channel 422, Sacramento River between Delta Cross Channel and Georgiana Slough in May

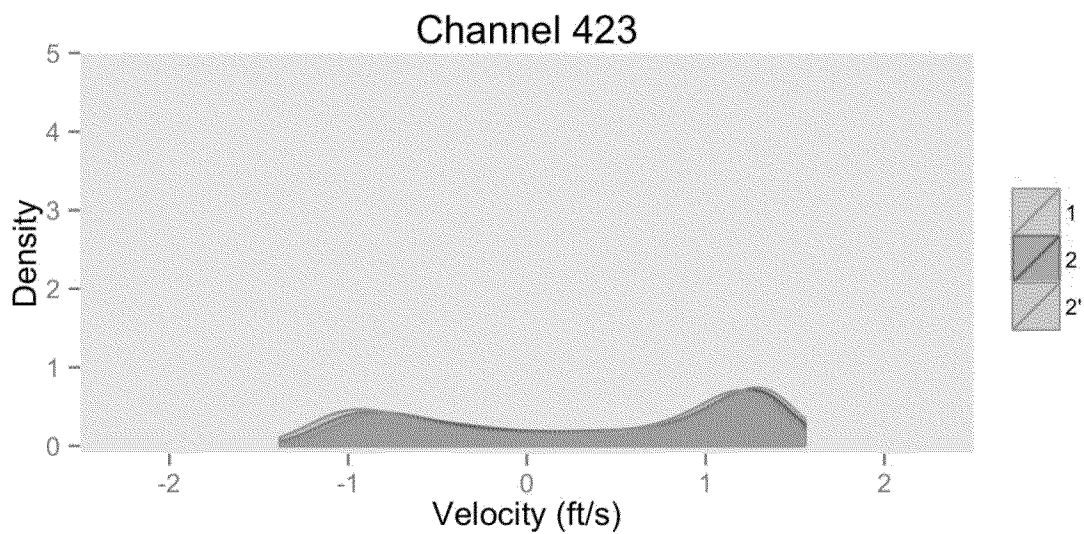


Figure 10. Density plot of velocity (ft/s) observed for DSM2 Channel 423, Sacramento River downstream of the Delta Cross Channel and Georgiana Slough in April

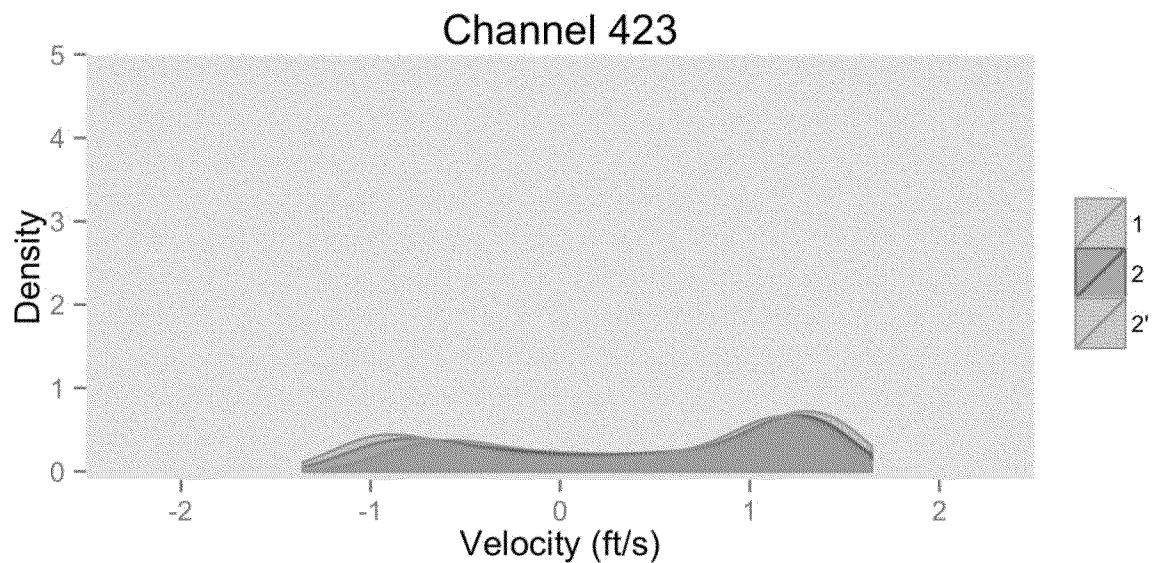


Figure 11. Density plot of velocity (ft/s) observed for DSM2 Channel 423, Sacramento River downstream of the Delta Cross Channel and Georgiana Slough in May

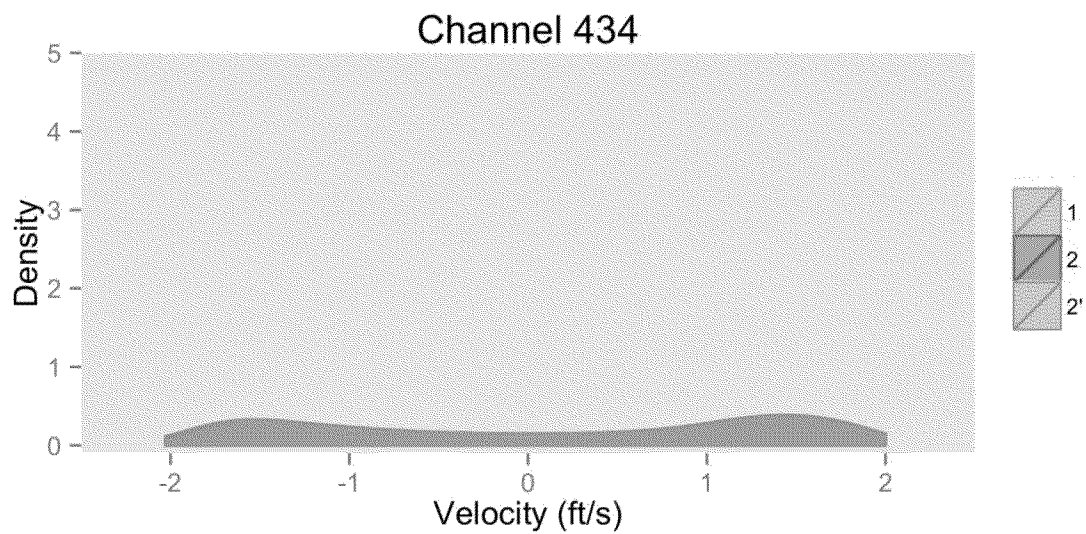


Figure 12. Density plot of velocity (ft/s) observed for DSM2 Channel 424, Sacramento River between Decker Island and Sherman Island in April

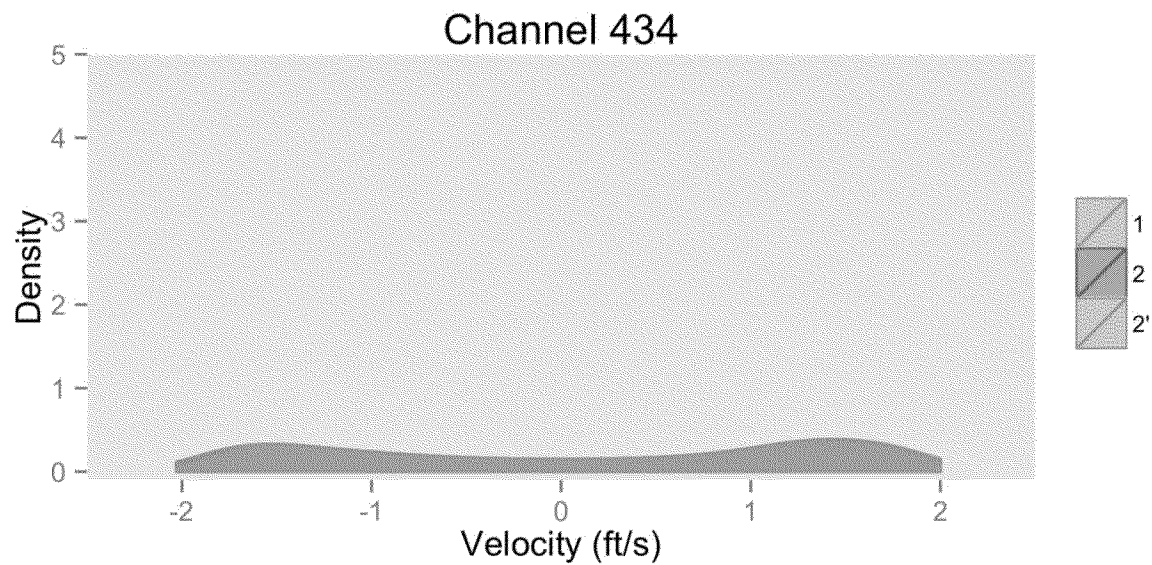


Figure 13. Density plot of velocity (ft/s) observed for DSM2 Channel 424, Sacramento River between Decker Island and Sherman Island in May

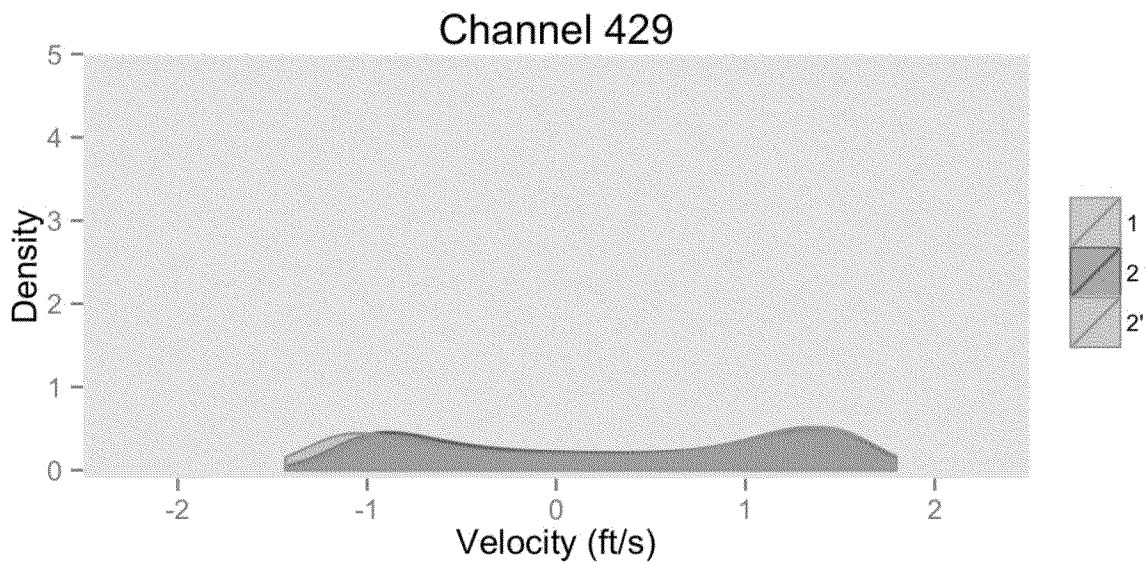


Figure 14. Density plot of velocity (ft/s) observed at DSM2 Channel Node 412 under three scenarios during the April modeled period (Sacramento River near Cache Slough, North Delta)

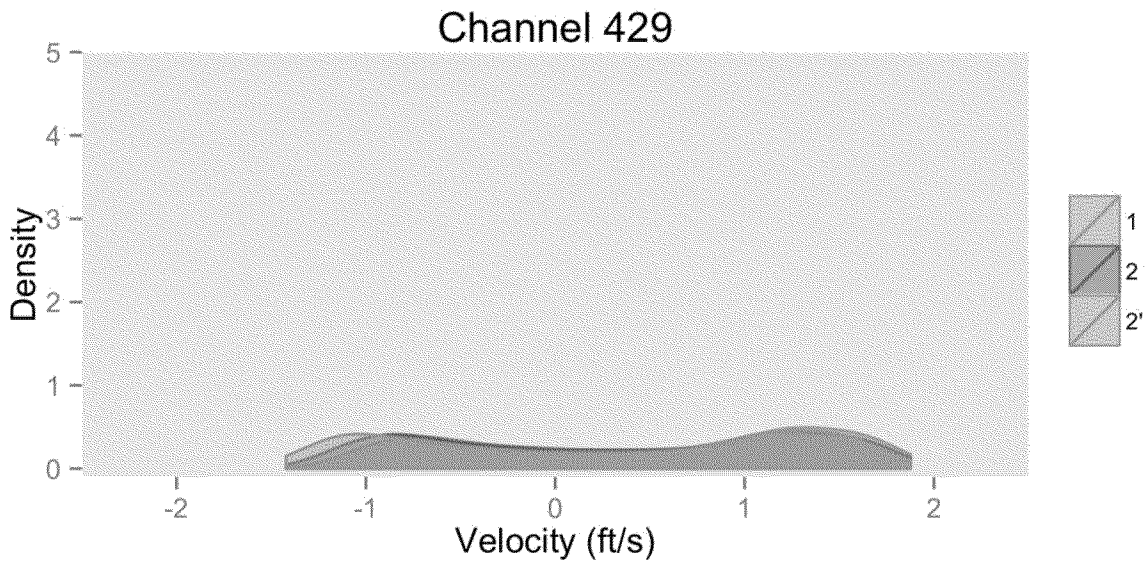


Figure 15. Density plot of velocity (ft/s) observed at DSM2 Channel Node 412 under three scenarios during the May modeled period (Sacramento River near Cache Slough, North Delta)

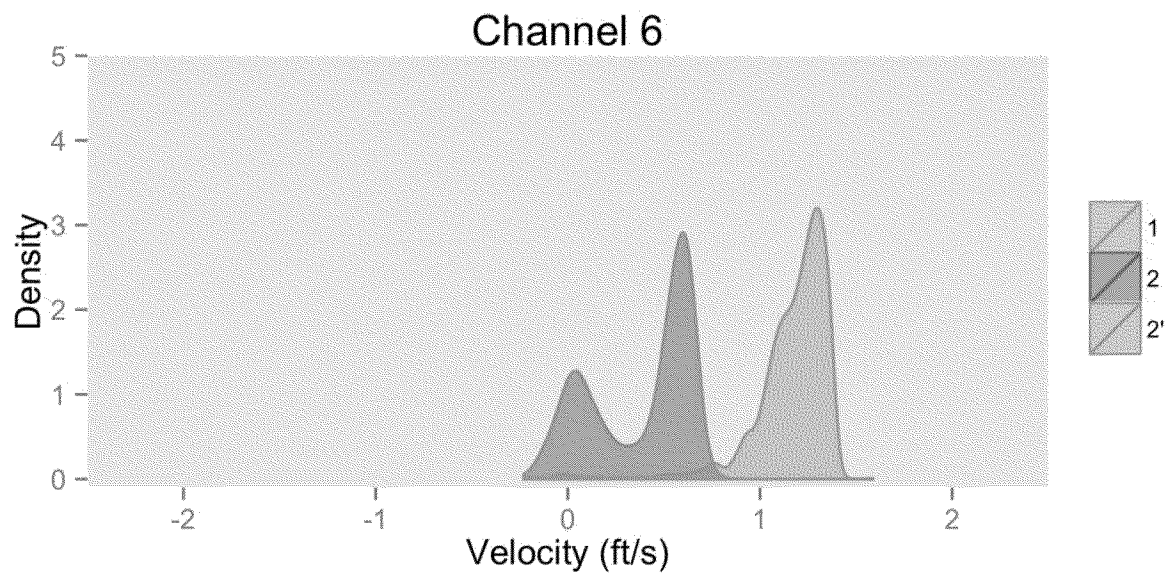


Figure 16. Density plot of velocity (ft/s) observed at DSM2 Channel Node 6 under three scenarios during the April modeled period (Upstream of Head of Old River on San Joaquin, San Joaquin)

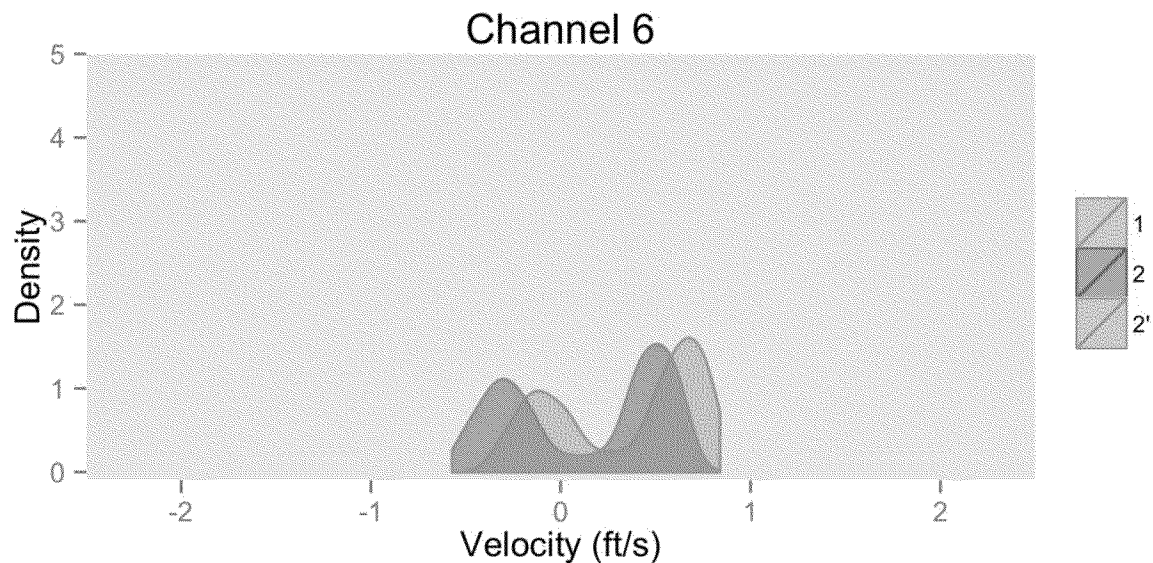


Figure 17. Density plot of velocity (ft/s) observed at DSM2 Channel Node 6 under three scenarios during the May modeled period (Upstream of Head of Old River on San Joaquin, San Joaquin)

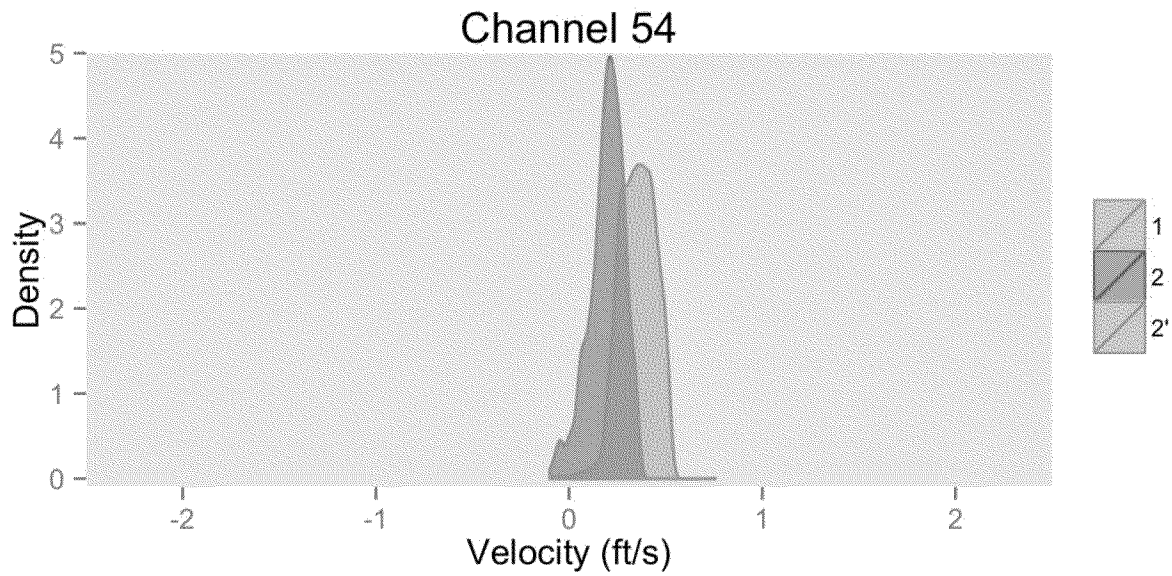


Figure 18. Density plot of velocity (ft/s) observed at DSM2 Channel Node 54 under three scenarios during the April modeled period Downstream of Head of Old River on Old River, San Joaquin)

⋮

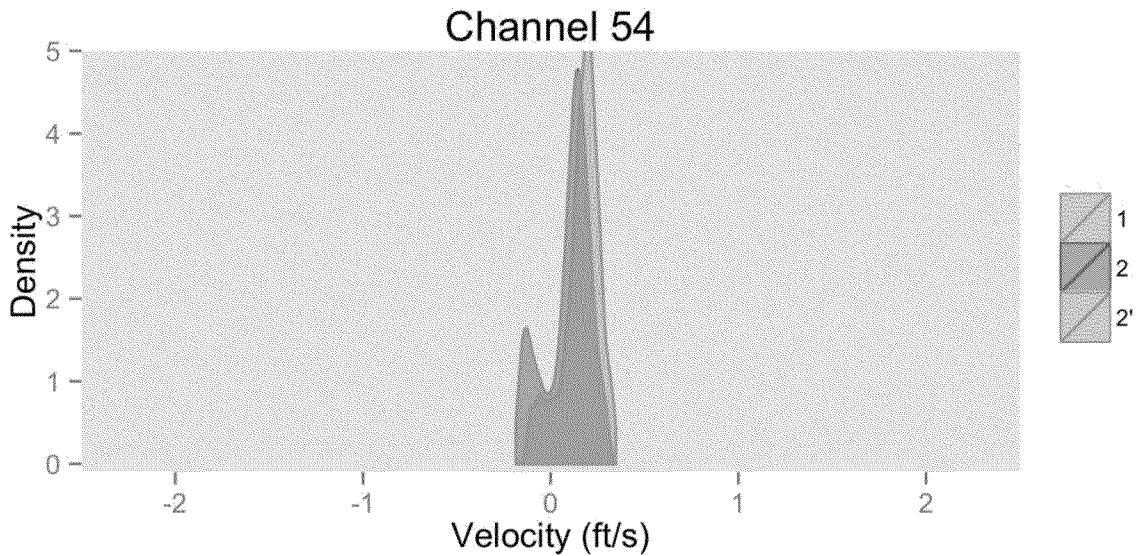


Figure 19. Density plot of velocity (ft/s) observed at DSM2 Channel Node 54 under three scenarios during the May modeled period (Downstream of Head of Old River on Old River, San Joaquin)

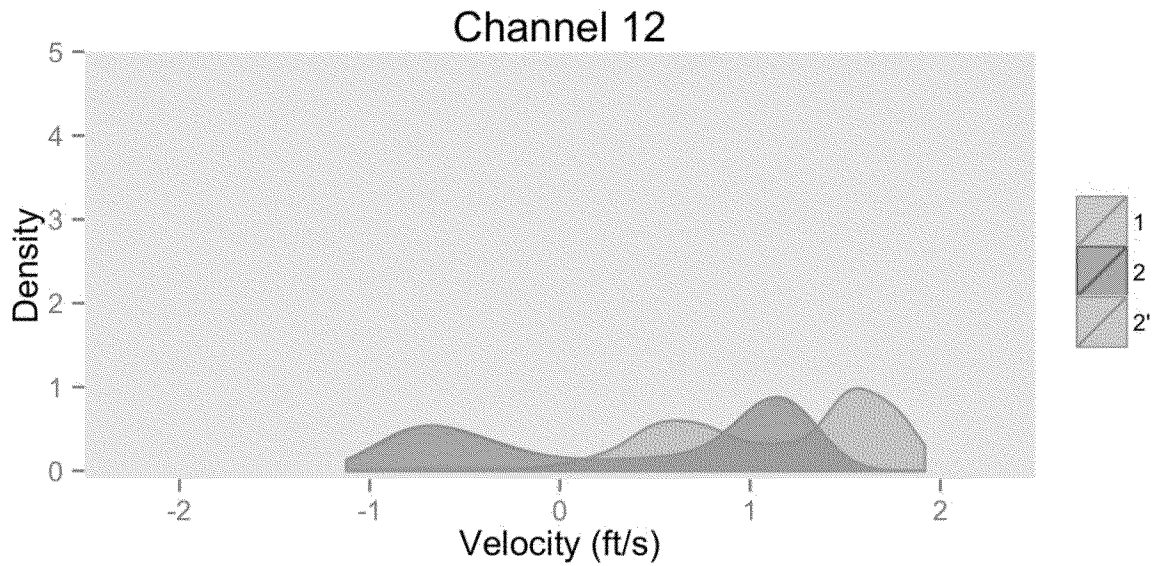


Figure 20. Density plot of velocity (ft/s) observed at DSM2 Channel Node 12 under three scenarios during the April modeled period (Upstream of Stockton Deepwater Shipping Channel , South Delta)

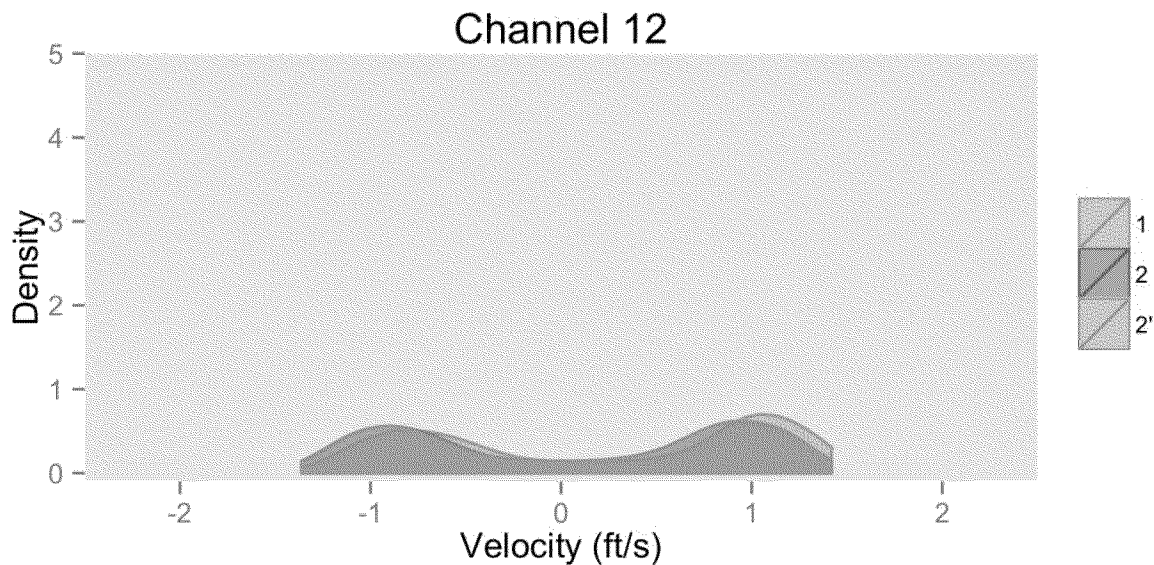


Figure 21. Density plot of velocity (ft/s) observed at DSM2 Channel Node 12 under three scenarios during the May modeled period (Upstream of Stockton Deepwater Shipping Channel , South Delta)

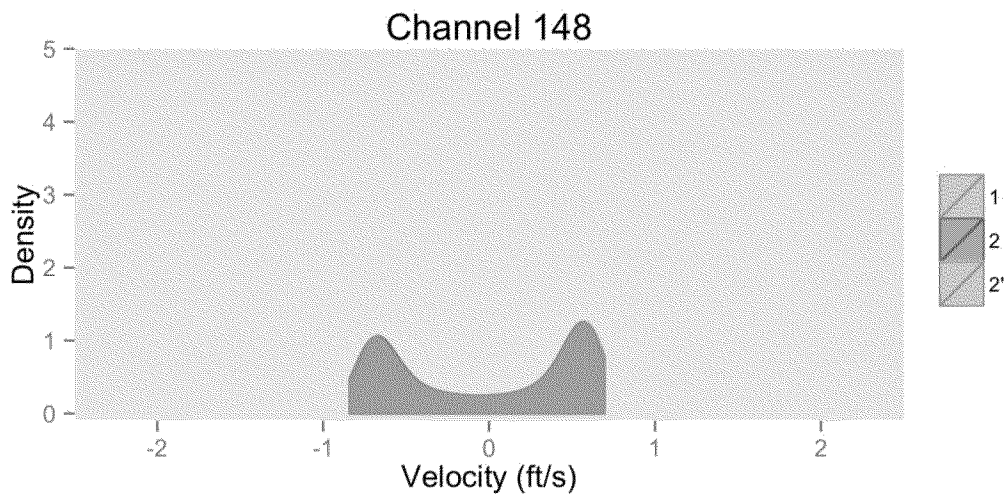


Figure 22. Density plot of velocity (ft/s) observed for DSM2 Channel 148, Middle River north of Railroad cut, in April

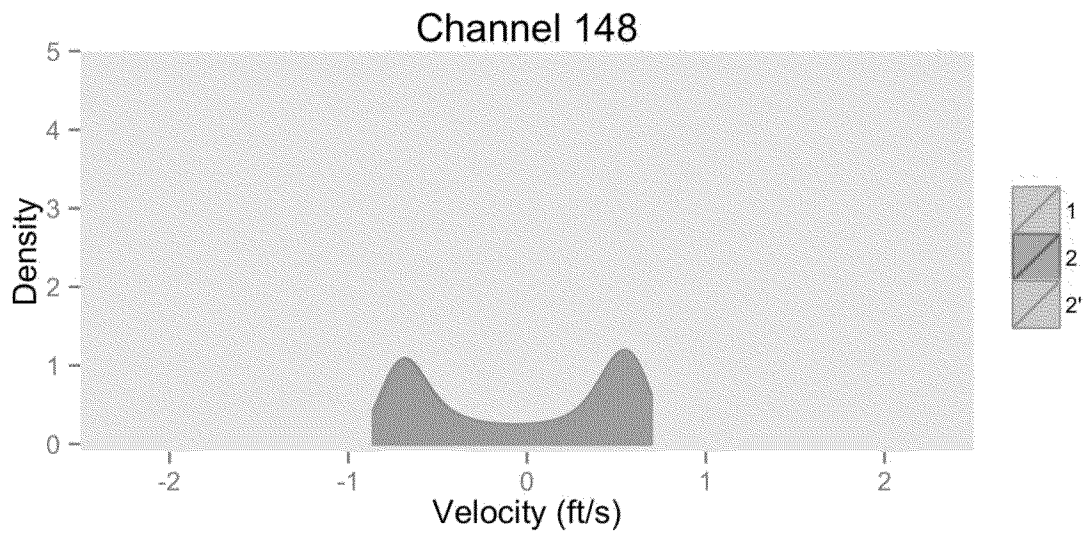


Figure 23. Density plot of velocity (ft/s) observed for DSM2 Channel 148, Middle River north of Railroad cut, in May

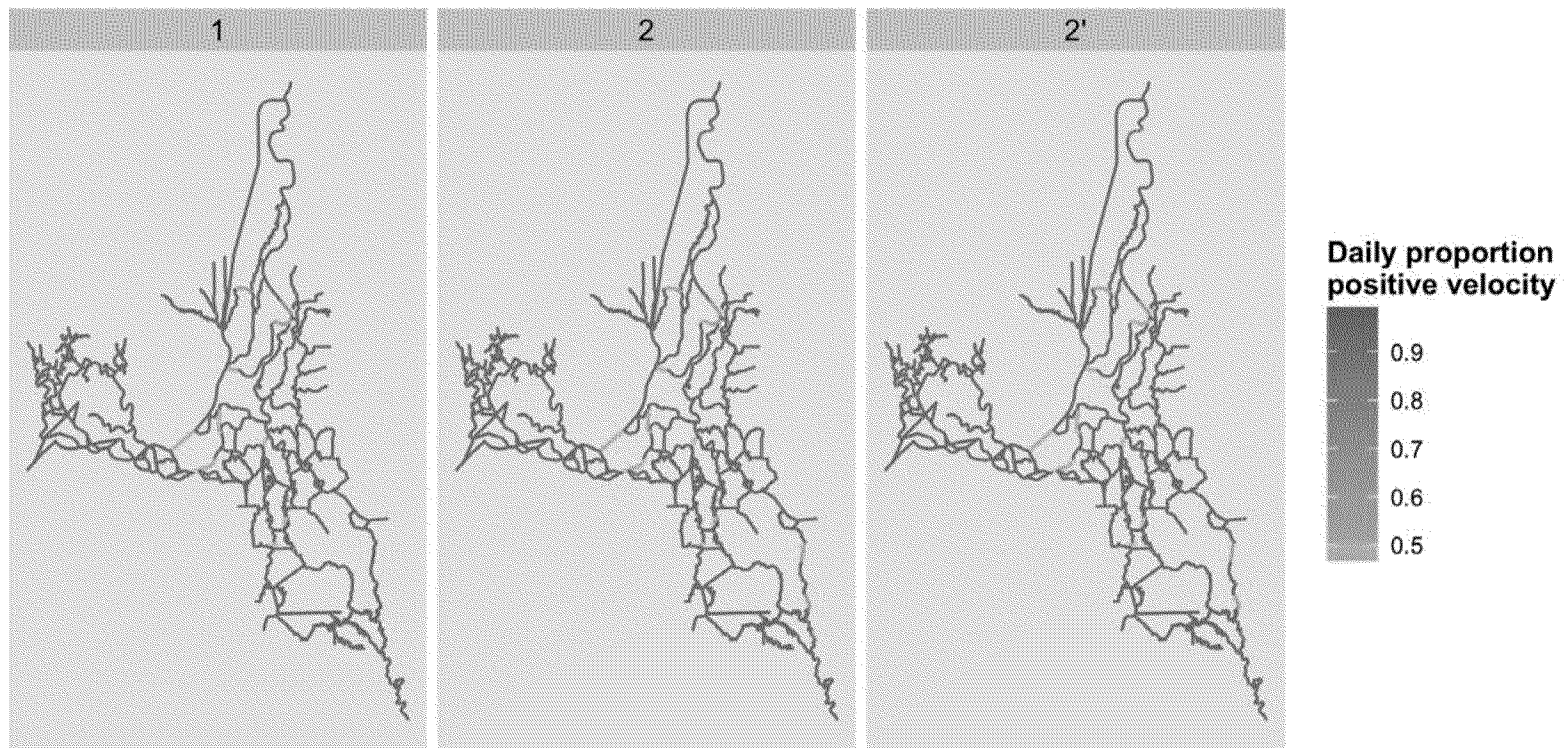


Figure 24. Maps of the Delta with Key Channels Color-Coded for Daily Proportion Positive Velocity, May 2015

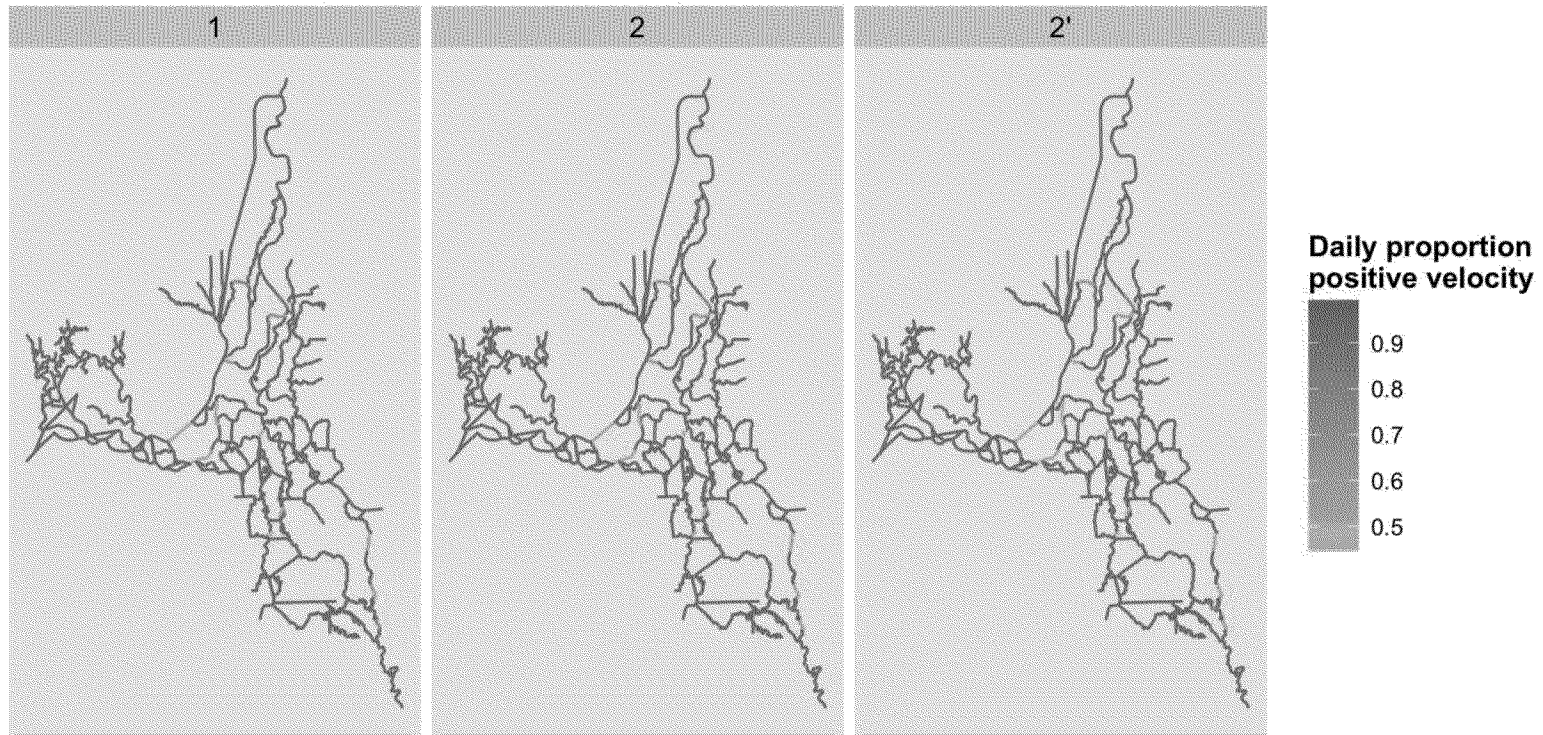


Figure 25. Maps of the Delta with Key Channels Color-Coded for Daily Proportion Positive Velocity, April 2015

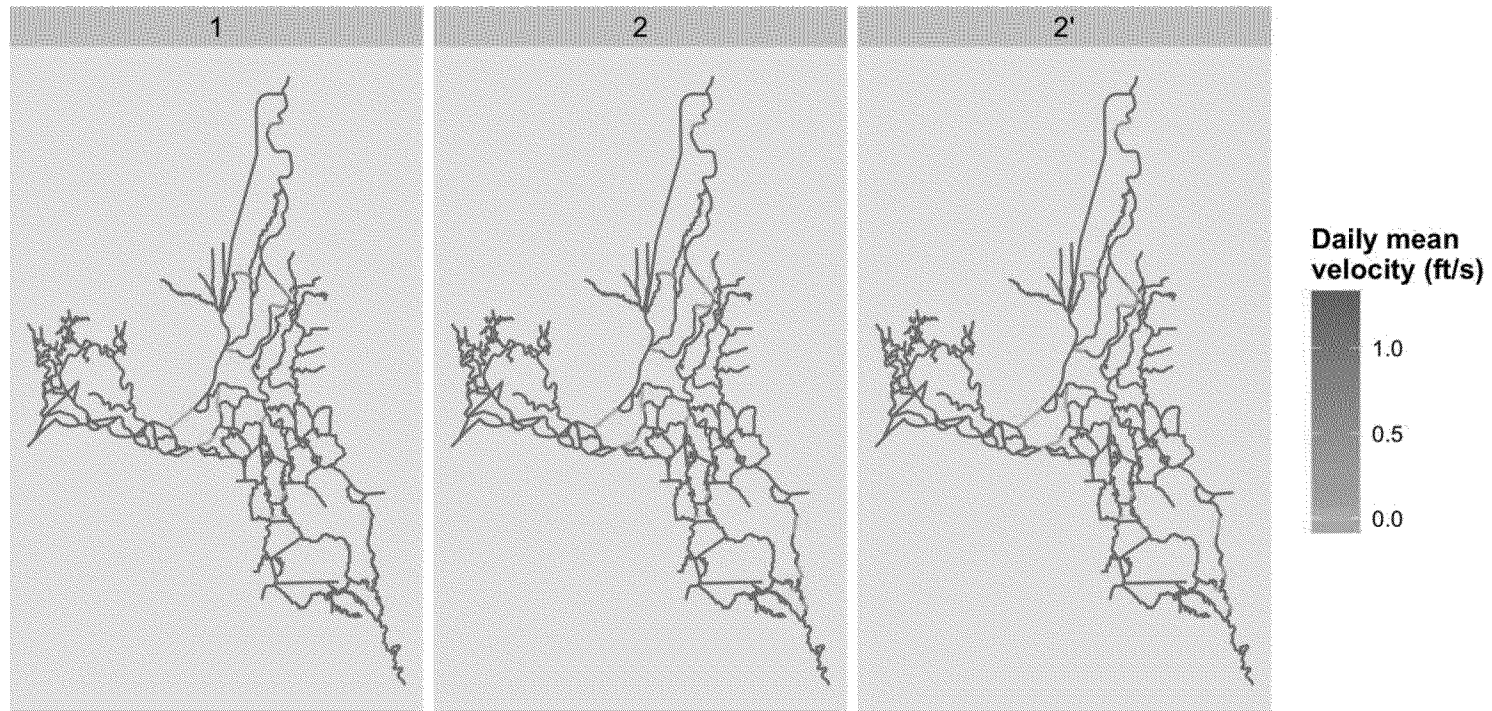


Figure 26. Maps of the Delta with Key Channels Color-Coded for Daily Mean Velocity Generated from DSM2, May 2015

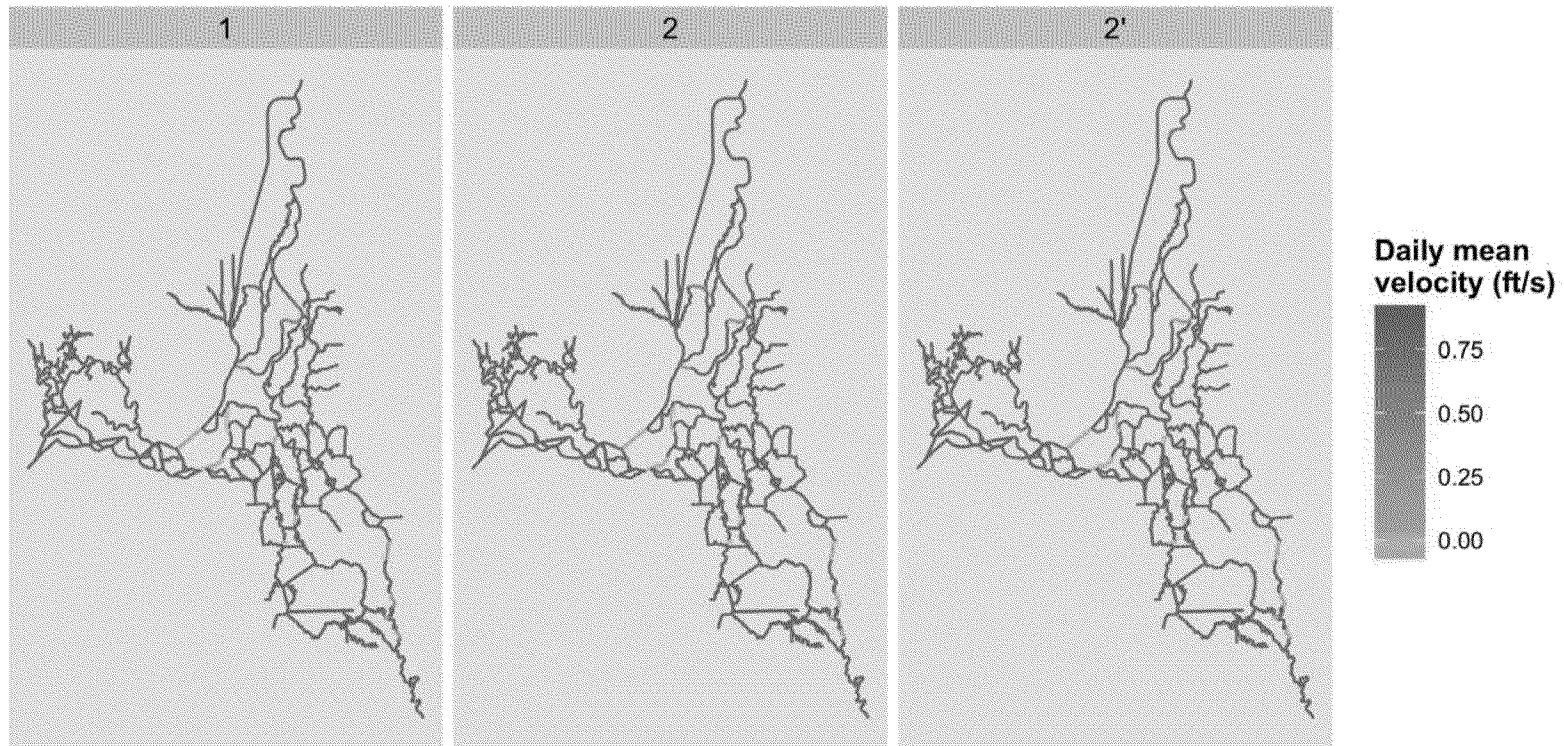


Figure 27. Maps of the Delta with Key Channels Color-Coded for Daily Mean Velocity Generated from DSM2, April 2015